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[OFFICIAL NOTICE.]

March Meeting, New York Section, Illuminating Engineering Society.

OFFICE OF SECRETARY,
227 FULTON STREET,
NEW YORK, FEB. 24, 1910.

The March meeting will be held on the evening of Thursday, the 10th, at 8:15 o'clock, in the United Engineering Society's Building. The papers of the evening will be "The Relationship of Decoration to the Illuminating Engineer Practice," by Mr. C. R. Clifford, author "Color Values," "Decorative Period," Member of Jury on Decoration, Louisiana Exposition (St. Louis); "Color Measurements of Illuminants, A Resumé," by Dr. H. E. Ives, Physicist, National Electric Lamp Association; and "A Standard for Color Values of Artificial Lights—The Moore White Light," by Dr. McFarlan Moore, Inventor Moore Vacuum Tube Light. Subjects will be illustrated by stereopticon views, also demonstrations. Dr. E. P. Hyde, President of the Illuminating Engineering Society, will preside.

A. J. MARSHALL, Secretary.

[OFFICIAL NOTICE.]

Annual Meeting, Illinois Gas Association.

ILLINOIS GAS ASSOCIATION,
OFFICE OF SECRETARY,
ELGIN, ILLS., Jan. 21, 1910.

To the Members, Illinois Gas Association: The next meeting of the Illinois Gas Association will be held at the La Salle Hotel, Chicago, Ills., March 15 and 16, 1910. A number of excellent papers have been prepared, and an enjoyable meeting is assured.

Yours truly, C. B. STROHN, Secretary.

[OFFICIAL NOTICE.]

American Gas Institute.

AMERICAN GAS INSTITUTE,
OFFICE OF SECRETARY,
NEW YORK, Feb. 28, 1910.

Gentlemen—For your information, the Committee on Place of Next Meeting, Messrs. W. E. McKay, Chairman; J. D. Shattuck and F. W. Frueauff, have made a final report to the President, recommending that the 1910 meeting of the American Gas Institute be held in New York City.

This recommendation has been approved by the Directors.

Yours very truly, A. B. BEADLE, Secretary.

[OFFICIAL NOTICE.]

Second Annual Meeting, Pennsylvania Gas Association.

PENNSYLVANIA GAS ASSOCIATION,
OFFICE OF SECRETARY-TREASURER,
LEBANON, PA., Feb. 26, 1910.

To the Members of the Pennsylvania Gas Association: The meeting of the Pennsylvania Gas Association will be held in Easton, Pa., April 13, 14 and 15, 1910. Headquarters will be the Karldon Hotel. The following papers have been prepared:

"Distribution Shop Practice," by J. E. Arthur, Reading, Pa.

"Gas Meters from the Meter Man's Standpoint," by J. H. Mansur, Royersford, Pa.

"New Business: Methods for Solicitors' and Employees' Meetings," by George W. Thomson, Chester, Pa.

"Qualifications for Successful Manager of Public Service Corporation," by B. F. Cresson, Easton, Pa.

"Motor Cycle and Automobile Experience," by L. S. Williams, Harrisburg, Pa.

"Lecture on Illuminating Engineering," Norman Macbeth, Philadelphia, Pa.

"Lecture on Tar as Applied to Road Building," W. H. Fulweiler, Philadelphia, Pa.

"Gas Arcs: Installation and Maintenance," by J. H. Keppleman, Reading, Pa.

"Water Heating and Type of Apparatus for Residences," by H. D. Gillingham, Wilkes-Barre, Pa.

"Profitable Gas Advertising," by W. R. Rhoades, Williamsport, Pa.

"Burner Maintenance in Residence Districts," by F. J. Rutlege, Philadelphia, Pa.

"Coal Gas Manufacture," by W. H. Merritt, Lebanon, Pa.

"Experience with Measuring Devices for Air, Steam and Temperature as Applied to Water Gas Apparatus," by John A. Brick, Allentown, Pa.

Short Exchange Topics:

"Office Forms and Help," and "Maintaining Constant Candle Power During Year," by L. R. Dutton, Wyncote, Pa.

LIBRARY OF CONGRESS
MAR 7 1910
SMITHSONIAN DEPOSIT

Arrangements have been made for a theater party, an informal dinner and to visit the plant of the Ingersoll-Rand Drill Company.

Everybody interested in the gas industry is cordially invited to attend. Respectfully, W. H. MERRITT, Secretary.

BRIEFLY TOLD.

OBITUARY NOTE, ALBERT M. SMITH.—After an extended struggle with an illness that would not be denied, Mr. Albert M. Smith, Engineer of Distribution to the Consolidated Gas Company, of this city, died at his apartments, in the San Remo Hotel, Central Park West, the morning of Sunday, the 27th ult. He was in his 72d year, and is survived by his widow and 3 children (these by a former marriage), Charles and Gouverneur Smith and Mrs. Katherine Lattler. In 1852, when in his 15th year, he entered the engineers' division of the old Manhattan Gas Light Company, of which corporation his uncle (Mr. William A. Smith) was one of the organizers, and his father (Mr. Charles Smith) served it as General Superintendent of Distribution. Studious and resourceful, Mr. Smith in comparatively short time became Superintendent of the West 18th Street Station of the Manhattan Company. At the outbreak of the Civil War, Mr. Smith, who had for some time been prominent in the affairs of the Seventh Militia Regiment, joined the 37th Regiment, New York Volunteers, which body had been directly organized by the well and lovingly remembered Charles H. Roome, then President of the Consolidated Gas Light Company. This regiment was organized in the then offices of the Manhattan Company—now the chief offices of the Consolidated Gas Company—No. 4 Irving Place, and was commanded by Colonel Roome during its service in the War of the Rebellion. Mr. Smith was chosen Captain of Company B, the membership of which was largely recruited from the force of the gas works, and it is worthy of note that on the very floor now carrying the office which was the headquarters of Mr. Smith, in his position of Engineer of Distribution to the Company, Captain Smith drilled and perfected his men in military tactics pending their departure to the front. When the invasion of Pennsylvania was threatened by the Confederate Army under General Lee, the 37th Regiment was despatched to that State, and Captain Smith's troops were also ordered to protect the threatened Capitol, but were subsequently detailed to Baltimore, where they remained quartered in Camp Belger for some months. During this period Captain Smith was placed in charge of a special detail, which, through the aid of a small steamer, searched the waters of Chesapeake Bay, and the adjacent rivers and other water ways, routing out the river pirates and their lawless land aids that infested even to terrorizing the labyrinthine mazes of the Chesapeake and its tributaries. He saw further active service, notably in connection with the draft riots in New York city, where he remained in active duty until the situation was put in control of the regular army troops. At the close of the war, and at the time of the determination of its proprietors to enter the merger that resulted in the formation of the Consolidated Gas Company, he was the Manhattan Company's Chief Engineer, having succeeded the late Mr. C. Vandervoort Smith, of beloved memory, in that important position. He remained actively in charge of the West 18th street station of the Company until 1901, when he was formally appointed Engineer of Distribution to the Consolidated Company, with headquarters in No. 4 Irving Place. At the time of his death he had been connected with the gas supply of New York city for a period of 57 years. He was a charter member and Vice-President of the Society of Gas Lighting, which body is the oldest existing technical Gas Association in the country, and for many years had been on the membership rolls of the American Society of Civil Engineers. In 1902, on the occasion of the anniversary of Mr. Smith's 50th year of service in the gas business, Mr. Harrison E. Gawtry, then President of the Consolidated Gas Company, presented to him, on behalf of the Trustees, a loving cup, in commemoration of the unfaltering nature and steadfast loyalty of the service that he had rendered the industry during a half century of earnest, active, successful connection therewith. Deceased was twice united in marriage, his first wife being Miss Anna Provost Ehves, March 18th, 1863. His second marriage occurred October 22d, 1878, when Miss Jane H. Bull became his wife. To the majority of the men now actively engaged in the gas profession—that is, as far as other than the Eastern section of the fraternity is concerned—"Al." Smith, as he was lovingly known to his intimates, may not have been well known, and so it is the writer's province and sad pleasure to say that, after an acquaintance of two score years, the latter part of which was very close indeed, that no other man whom he knew or knows in our mutual cause is better fitted to have read over him these immortal lines from the pen of the great Commoner Kipling:

"E'en as he trod that day to God,
So walked he from his birth,
In simpleness and gentleness and
honor and clean mirth!"

He was the friend, companion counsellor and confidant of such men as Major G. Warren Dresser, Eugene Vanderpool, Col. Joseph R. Thomas, George A. McIlhenny, Wm. McDonald, Wm. H. Bradley and innumerable others of like standing in the history, past and present, of our industry, and few who ever lived lived to better or purer intent or purpose. The funeral services were held in All Souls' Unitarian Church, 20th street and 4th avenue, the morning of the 2d inst., the Rev. Thomas R. Sliser officiating. The floral tokens were many and magnificent. The services were impressive, and the mourners taxed the capacity of the edifice. And not the least sincere of these were some of his former employees, whose tear-stained, weather-beaten faces were of a verity the greatest testimonial that could be offered to his worth as a director of men. The Society of Gas Lighting attended the services in a body. For this much of the detail in this hastily prepared sketch we are indebted to the courtesy and collaboration of his son, of Chief Wm. H. Bradley, of Mr. Oscar H. Fogg, and others.

PRESIDENT CONGDON'S ADDRESS.—The address of President Congdon, of the Southern Gas Association, is a most welcome addition to the usual amenities offered by those leaders among the fraternity whom we take pleasure in honoring. This Association has passed the informal stage and is getting down to business in a manner which would do credit to the larger and better known of the associations. In addition to the frank expressions of the needs and the usefulness of the work being undertaken, the data contained in the address brings forcibly to our minds the ever present need of increasing the output, especially in the smaller companies. Too little has been said, and fewer statistics are available, concerning sales per capita, and much less on gross and net income per capita. The average price of our commodity is steadily decreasing, and the problem of increasing our output is of prime importance. New business campaigns are quite as essential as economies in works practice, and, as all will agree, neither should be neglected. The figures presented by Mr. Congdon show what great rewards are ahead for those who would develop the use of the product. While the odds are all in favor of their Northern brothers, nevertheless the sales per capita, in these Southern cities, undoubtedly will show great advances in the coming years.

CURRENT MENTION.—

MR. GILBERT B. HARRIS, who has been connected for several years with the Pueblo (Col.) Gas and Fuel Company, has resigned and will join the staff of the Spokane (Wash.) Gas Company.

THE Peoples Gas Company, of Kansas City, Kas., was granted a charter on February 14. It has $1,000,000 capital. It proposes to produce both natural and artificial gas and market the same. The incorporators are: George P. Heckel, James G. Stream and A. L. Cooper, of Kansas City, Mo.; R. L. Disney, G. W. McCamish, E. A. Wheatley and O. C. Smith, of Kansas City, Kas.

MR. WM. E. HARTMAN, for the last 6 years Superintendent of the Joliet plant of the Western United Gas and Electric Company, has resigned to accept a position with H. Kopper, by-product coke oven constructor, Joliet, Ills. His successor is Mr. Howard G. Stillson formerly Superintendent at Fort Worth, Tex.

THE merger just perfected, whereunder the East Ohio Gas Company (natural gas) succeeds to the properties of the Cleveland Gas Light and Coke Company and of the Peoples Gas Light Company, means that the sortie by the Standard Oil Company on these properties some years ago has been carried to a successful conclusion. The outstanding capital of the three companies is $12,000,000, and in a short time this will amount to $20,000,000, with a more than likely indebtedness in the shape of $15,000,000 bonds. Selah!

ADVICES from Richmond, Va., are to the effect that public buildings lighted by electricity will hereafter be required to conform with an order issued last week by Buildings' Inspector Beck to the officers of the Leath Theatrical Company, which owns the building, to Manager Ed. P. Lyons, of the Colonial, and Manager Charles I. McKee, of the Bijou. These have been instructed to provide a gas lighting system in addition to the electrical system. The gas jets are to be kept lighted while the performances are being given, and the house open to the public, in case the electric current is cut off suddenly by reason of accident or otherwise. The requirement of the code applies to all buildings and halls owned by the city and those in which public meetings are held.

Address of President R. C. Congdon, Second Annual Meeting, Southern Gas Association, Chattanooga, Tenn., Feb. 16, 17, 18, 1910.

Gentlemen: It is with full appreciation of the honor you have conferred upon me in electing me your President, and it is with very great pleasure I now address this, the second annual convention of the Southern Gas Association.

It seems hardly possible that a year has passed since we met in that beautiful and interesting city of New Orleans, where we enjoyed not only an enthusiastic business meeting, but the social features, which I am sure we all enjoyed, will be remembered with the keenest pleasure.

We meet to-day in Chattanooga, a city famed for its historical interests, a city offering us every comfort, sheltering us beneath the roof of one of the finest hotels in the country, a city enjoying with just pride its rapid growth and development.

It is quite customary in addresses of this nature to review the problems and note conditions that confront the industry. Excellent papers have recently been presented to other Associations giving just such valuable and interesting information, and for this information I respectfully refer you to the gas journals.

The Southern Gas Association is the subject which I have chosen to present to you for your careful and earnest consideration.

The questions I will ask, and will for my part endeavor to answer, are:

1. Is there need of a Southern Gas Association?
2. If there is need of such an organization, what steps should be taken to make it grow in usefulness and efficiency?
3. Is our territory too large or should it be divided into several State or District Associations?

Taking up the questions in their order let us consider the first question: Is there need of a Southern Gas Associasion in the South? I unhesitatingly answer, yes. The gathering together of men for the purpose of discussing problems pertaining to one's business or professional calling is certain to prove of advantage. This is amply proven, not alone by the number of gas associations which have lived long and prospered, but by the great number of other associations organized for advancement along some special line of human activity. I do not believe there is a man here who is not certain that a gas association is a necessary organization, or who would view the termination of gas association work as anything short of a calamity, but there may be some who are not sure that a Southern Gas Association is necessary. Some Southern gas men may argue that the country already has a sufficient number of associations; that if the published proceedings of these associations are read and absorbed this information would be sufficient. They might further argue that the conditions in the South do not vary widely from those in the North, and that human nature is pretty much the same everywhere.

To say that there are already a sufficient number of associations is in effect to claim that all immediate problems confronting the gas men in various parts of the country will be dealt with at opportune times by associations now established. It would be an argument against the association of the individual company having for its members the heads of its various departments.

At the last meeting of the department heads of our company subjects presented for future discussion were as follows:

Shall we pay more than one price for second-hand stoves?
Is it advisable to purchase and repair second-hand water heaters?
Should meters be set with iron connections?
The harmonious working together of all departments.
Handling of complaint orders of excessive bills; also to what extent should the company go in repairing leaks in house piping?
The obligations of the company to injured employees.
The extension of the use of gas engines by displacing steam or gasoline engines.
How to get Atlanta to use road tar on all new macadamized roads.
The maintaining of household and industrial appliances.
How can stoppages in service pipe be prevented?
How should the work of clearing the service be accomplished?

None of the above subjects were suggested by me. They all came from the gentlemen associated with me in the management of the Company.

Some of you might say, why there have been a dozen papers written on stoppages in service pipes. The question of meters with iron connections has been satisfactorily settled, and that all should now understand the proper method of handling complaint orders of excessive or supposed excessive bills.

It is, I agree with you, difficult to find a subject concerning our business which has not received consideration at some gas convention, and I used to think it a waste of time to bring the same old subjects up for discussion; but if the person presenting the paper reads what has already been written, it is possible he can develop something new; but even if he cannot, he may start a useful discussion, and he is equipped to answer questions on the floor of the convention, and assume for the time being a role not unlike that of the college professor who propounds the same old problems to each incoming class.

Some men acquire knowledge only on account of necessity. Their positions require certain information. Other men not only accomplish well each task given them, but constantly apply themselves to the acquiring of additional knowledge which will lead them to higher and more responsible positions.

There are a lot of men of the latter class this Association is bound to help.

The Southern Gas Association has already proved of value to the industry in inducing men to become members of some gas association. There are men on our membership list who are not members of any other gas association and never have been. These men will soon be referring to the bound proceedings of the Southern Gas Association for information, just as many of you and I have referred to the proceedings of the Western, the Ohio, the American, the National Commercial Gas Associations and the American Gas Institute.

That many of those engaged in the gas industry in the South have been appreciative of the value of association work is shown by the records of other associations. In 1907 there were 75 members of the American Gas Institute from the territory covered by our organization. In 1909 it is noted with regret that the number had decreased to 64, but I hope this year you will all become members of the Institute. The decrease referred to is due to reduced membership in the following States: Florida, Georgia, Kentucky, Mississippi, North Carolina and Virginia. South Carolina it appears has never been represented in the Institute, and 1909 Brown's Directory shows that this State has no members in the other associations, but the Southern Gas Association can boast of one member from South Carolina.

Men from the States included in our Association are represented in other Associations as follows:

National Commercial Gas Association: Alabama, 1; Florida, 1; Virginia, 3; Georgia, 4; Tennessee, 8; North Carolina, 1; total, 18.

Illuminating Engineering Society: Virginia, 2; Georgia, 6; Louisiana, 3; Tennessee, 2; total, 13.

Southwestern Gas and Electric Association: Lousiana, 6; Georgia, 1; total, 7.

Every gas company in the South should join the gas associations, national in character and organized as they are for the general good.

Many conditions in the South do vary widely from those in other parts of the country.

We have little fear of straining or wrecking a holder on account of uneven load due to snow drift on the crown. Violets bloom in the South while the shriveled roots in the North have beneath them 3 or 4 feet of frozen ground. Our mild winter climate allows us to continue laying mains, while the distribution tools in the North rust in their sheds.

A white stoker in the South is as rare as a comfortable winter East wind in Boston. Yes, many conditions are different, but even if the present general differences were eliminated there would still be problems which could be profitably discussed before a gathering of Southern gas men, and just as we find our local Association a benefit to our company, so will the Southern companies find problems in common which when discussed at our meetings will benefit us all.

The second question. What steps should be taken to make this Association grow in usefulness and efficiency?

I fear I am too inexperienced to give satisfactory reply to this question, but will indicate the way as I at present see it.

1. Elect officers who have worked for the success of the Association.
2. Divide the territory into several sections and each year appoint a paper committee in every section.
3. Have a joint meeting of the Directors of the Association and the chairmen of the various committees at least 4 months before each Association meeting.
4. Select a meeting place for the annual convention, having in mind the desired large attendance.
5. Establish as soon as practicable a circulating library. The Association should at least own the proceedings of other associations. There should be a complete index of the subject matter, and books containing desired information should be loaned under carefully prepared rules.

6. There should be established a question box and wrinkle department.

7. Committees should be appointed from time to time to undertake special work. An active membership committee should be appointed at this meeting.

8. Our members should join the American Gas Institute, an organization national in character, its accomplishments redounding to the benefit of everyone of us, our companies and our customers. The Institute is organized to handle the heavy problems of our profession, problems which call for long experience, and in many instances exceptional opportunities. Its field of action is in many respects distinct from that of the smaller associations. When we grow stronger as a district association, the Institute will probably be glad to hear from us as a co-operative body, but I do not recommend affiliation at this time. I hope each of you who is not a member of the Institute will, before we leave Chattanooga, give me your name, stating your desire to become a member. I would be pleased to see that the names are proposed. The copy of the proceedings of the Institute sent to you each year would more than repay you the annual expense, and the information gained should render you more useful to our organization.

9. We must co-operate, we must unite our forces, we must move as does a well trained four in hand. If our leaders fall those at the wheel will possibly fall over them! if the wheelers fall the leaders can't pull the load. We must keep on our feet; every trace must be strained. We must get interested, and the way to get interested is to take part.

The third question: Is our territory too large, or should it be divided into several district or State Associations?

The data covering the situation in the cities included in our organization, as compiled from Brown's Directory, is as follows:

City or Town.	Number of Customers.	Total Annual Sales.	Population of District Supplied.	Annual Sales per Meter.	Annual Sales per Capita.
ALABAMA.					
Anniston	776	14,352,300	8,000	18,495	1,794
Bessemer	....	....	10,000	....	....
Birmingham	6,000	190,000,000	80,000	31,666	2,375
Eufaula	238	3,285,000	8,000	13,802	410
Florence	1,200	20,000,000	25,000	16,667	800
Huntsville	735	15,000,000	18,000	20,408	833
Mobile	4,000	125,000,000	40,000	31,250	3,125
Montgomery	2,900	75,000,000	35,000	25,863	2,142
New Decatur	350	8,000,000	12,000	22,856	666
Selma	870	20,000,000	16,000	22,989	1,250
Talladega	321	7,200,000	8,000	22,430	909
FLORIDA.					
Gainesville	400	5,000,000	5,000	12,500	1,000
Jacksonville	4,400	100,000,000	65,000	22,727	1,538
Miami	455	....	4,000	....	....
Ocala	117	4,600,000	2,400	39,316	1,917
Palatka	150	3,247,000	2,500	21,647	1,299
Pensacola	1,848	42,310,800	28,000	22,895	1,511
St. Augustine	800	27,748,300	6,000	34,685	4,625
Sanford	500	7,500,000	2,500	15,000	3,000
Tampa	1,360	45,399,000	25,000	33,382	1,816
GEORGIA.					
Americus	750	15,000,000	4,500	20,000	3,333
Athens	700	15,000,000	11,000	21,428	1,363
Atlanta	17,000	636,000,000	125,000	37,412	5,088
Augusta	3,100	97,693,700	50,000	31,514	1,954
Brunswick	265	7,500,000	9,000	28,302	833
Cartersville	175	6,300,000	5,000	36,000	1,260
Columbus	1,100	25,000,000	25,000	22,727	1,000
Dalton	325	10,000,000	4,000	30,769	2,500
Macon	2,700	75,000,000	35,000	27,778	2,143
Rome	875	16,000,000	9,000	18,287	1,777
Savannah	6,426	154,833,500	55,000	24,095	2,815
KENTUCKY.					
Bellvue	430	10,300,000	13,000	23,953	792
Bowling Green	700	15,000,000	14,000	21,429	1,071
Covington	7,595	150,000,000	98,000	19,750	1,531
Danville	500	13,000,000	5,000	26,000	2,600
Frankfort	1,500	23,000,000	14,000	15,333	1,643
Georgetown	238	2,500,000	4,000	10,504	625
Henderson	800	15,000,900	8,000	18,750	1,875
Hopkinsville	480	9,600,000	10,000	20,000	960
Louisville	13,500	600,000,000	80,000	44,444	7,500
Louisville	29,103	575,000,000	230,000	19,757	2,500
Maysville	535	12,000,000	6,000	22,430	2,000
Mt. Sterling	30	....	6,000	....	....
Owensboro	1,540	27,000,000	22,000	17,532	1,227
Paducah	1,567	28,000,000	20,000	17,869	1,400
Paris	348	12,000,000	7,000	34,483	1,714
Richmond	400	6,911,200	6,600	17,278	1,047
Shelbyville	125	....	4,000	....	....
LOUISIANA.					
Baton Rouge	220	5,018,900	5,000	22,813	1,003
New Orleans	23,000	700,000,000	350,000	30,434	2,000
MISSISSIPPI.					
Biloxi	942	21,000,000	20,000	22,293	1,050
Columbus	400	8,400,000	5,000	21,000	1,680
Greenville	549	10,161,000	12,000	18,508	847
Hattiesburg	212	12,000,000	8,000	50,603	1,500
Jackson	500	20,000,000	25,000	40,000	800
Meridian	1,312	27,300,000	16,000	20,808	1,706
Natchez	500	10,000,000	15,000	20,000	667
Vicksburg	1,897	43,216,143	10,000	22,781	4,321
NORTH CAROLINA.					
Asheville	....	6,098,000	12,000	....	508
Charlotte	2,339	44,967,750	30,000	19,225	1,499
Durham	650	15,000,000	6,000	23,077	2,500
Fayetteville	390	8,500,000	9,500	28,333	895
Greensboro	900	24,000,000	15,000	26,667	1,600
New Bern	....	....	8,000	...	....
Raleigh	1,647	28,194,200	11,000	17,119	2,563
Salisbury	606	15,816,700	20,000	26,100	791
Washington	374	10,000,000	10,000	26,738	1,000
Wilmington	1,500	31,000,000	38,000	20,667	816
Winston-Salem	1,009	17,000,000	10,000	16,848	1,700
SOUTH CAROLINA.					
Charleston	5,250	121,764,400	65,000	23,193	1,873
Columbia	1,350	28,957,000	40,000	21,772	724
Greenville	1,019	14,850,000	12,000	14,573	1,238
Spartanburg	400	12,000,000	15,000	30,000	800
TENNESSEE.					
Bristol	410	14,000,000	12,000	34,146	1,166
Chattanooga	4,352	139,000,000	40,000	31,939	3,475
Clarkesville	400	8,000,000	8,000	20,000	1,000
Jackson	2,094	.....	19,000		....
Knoxville	4,204	118,000,000	50,000	28,068	2,360
Memphis	12,000	320,000,000	125,000	26,666	2,560
Murfreesboro	120	2,500,000	7,000	20,000	357
Nashville	....	270,000,000	150,000	....	1,800
VIRGINIA.					
Ashland	....	.....	2,000	....	....
Alexandria	1,500	33,000,000	15,000	22,000	2,200
Charlottesville	550	15,000,000	8,000	27,273	1,875
Danville	1,268	50,272,200	19,000	39,647	2,645
Fredericksburg	600	13,000,000	4,000	21,667	3,250
Hampton	...	.....	25,000	....	....
Lynchburg	1,951	40,000,000	36,000	20,502	1,111
Newport News	1,699	37,102,900	27,000	21,838	1,374
Norfolk	7,750	242,000,000	45,000	31,226	5,378
Petersburg	1,750	50,000,000	25,000	28,571	2,000
Portsmouth	2,000	47,000,000	20,000	23,500	2,350
Richmond	11,557	376,015,510	112,000	32,536	3,357
Roanoke	3,260	36,000,000	22,000	11,043	1,636
Staunton	1,275	29,621,400	12,000	23,232	2,468
Suffolk	263	6,000,000	12,000	24,715	542
Winchester	550	9,000,000	5,500	16,364	1,636
WEST VIRGINIA.					
Charles Town	200	3,000,000	4,000	15,000	750
Clarksburg	....	.....	10,000	....	...
Martinsburg	500	6,000,000	10,000	12,000	600
Wheeling	6,000	116,000,000	48,000	19,333	2,417

Thirty-six companies have an annual sendout of 12 million or less, 20 companies have an annual sendout of 25 million or less, and 19 have a sendout of 50 million or less. Of the companies having a sendout in excess of 50 million, Florida has one, 100 million; Georgia has four, 636 million, 155 million, 125 million and 75 million; Louisiana has one, 700 million; 98 million and 75 million; Alabama has three, 200 million; South Carolina one, 142 million; North Carolina none; Tennessee four, 320 million, 270 million, 132 million and 139 million; Kentucky has three, 600 million, 575 million and 150 million; Virginia has two, 400 million, 242 million, and West Virginia has one, 116 million.

Most of the companies manufacture coal gas only; quite a number make water gas only; and a few manufacture both coal and water gas. It will be noted that most of the companies are small, and we, therefore, are essentially a small works Gas Association, and an Association which should receive magnificent support.

The number of States specified in our Constitution was decided upon by the vote of the gentlemen present at the organization meeting. Our Secretary has informed me that the question of the admittance to active membership of gentlemen residing outside of our present territory will come up for discussion at this meeting. I have received letters from Texas indicating that our Association has attracted favorable attention in that quarter. One of the papers to be read at this meeting will be presented by a gentleman from Texas, but the State of Texas is not included in the territory specified. From the data I have given you will see upon a little further investigation how few companies we have in the South as compared with the number in the North and East. Six or seven companies in any one of our Southern States represented at a Southern State Association, would unquestionably be benefitted by such an organization, but judging from my work for the Association during the past year, I am of the opinion the time has not yet come when the State Association would prove a success. When interest in association work has materially

increased in the South, it may prove advisable to have the present territory divided into several districts or State associations, but for the present I am in favor of adding Texas to and dropping Virginia and West Virginia from our organization. I am not in favor of admitting to active membership gentlemen residing outside our present territory.

The first meeting of our Association was attended by 37 active members. The papers presented were interesting and instructive. The meeting, while conducted in accordance with parliamentary practice, was of an informal nature. The genial atmosphere of the South pervaded the meeting, the Southern accent of the speakers made us feel at ease and at home.

It is impossible to state just what were the beneficial results of our first meeting, but I feel sure I can point to some members who, through their introduction by, and work for this Associotion, have been advanced to positions of greater responsibility. Letters also, addressed to me and from Southern gas men who were not present at the first meeting, furnish encouraging indications that our work is proving of material benefit.

It is to be hoped that our Association will continue to grow in usefulness. We should be a source of light as well as reflectors. While endeavoring to render facts concerning our business common knowledge, we should strive to be originators, to give to the industry something which will prove of further blessing to mankind.

Last year I exhibited my 5-gaited saddle horse at the Greenville, S. C., Horse Show. The riding suit I wore was the latest style from New York, but the coat unfortunately resembled a Prince Albert. The combination of riding boots and long black coat attracted considerable attention.

"Look at the country preacher," I heard one man say. Unfortunately my friends from Atlanta who accompanied me also heard the remark, and I was, amid much merriment, called preacher during the balance of my stay at the show.

Now, I have the greatest respect for the honored calling, but I hope you, having heard of my experience in South Carolina, will spare me in Tennessee, and will believe that my aim has not been to preach, but has been to offer you what little help my limited experience allows.

The Southern Gas Association is but 2 years old. Its history is contained between the covers of a very modest volume, but that volume represents work. It represents in a large measure the force which has been applied. It represents movement of machinery; it represents the first full stroke of the piston.

We are assembled here I hope with renewed energy and with a determination to make this Association a success. The piston is completing its second stroke, the governor has shown no indication of throttling the steam supply. As the center is passed over this time let us apply much more pressure, let us unite in our effort to keep the machinery in ever accelerating motion, and let us hope that as a reward for our expended energy the product of the mill will prove useful alike to ourselves and to our customers, and to the future members of the Southern Gas Association.

[CONTINUED FROM PAGE 390.]

REPORT OF PROCEEDINGS, FOURTH ANNUAL MEETING, AMERICAN GAS INSTITUTE.

HELD IN THE HALL OF ELKS, DETROIT, MICH., OCTOBER 20, 21 AND 22, 1909.

SECOND DAY—MORNING SESSION, Oct. 21, 1909.—*Technical Session.*

The Chairman—We shall have to pass on now to Mr. Edw. C. Jones' paper on

THE DEVELOPMENT OF OIL GAS IN CALIFORNIA.

Mr. President and Gentlemen: When Mr. Prichard invited me to write a paper for this meeting on the subject of oil gas in California I hesitated, knowing that it would, at the best, be irrelevant to the gas industries of the East. The subject of oil gas in California is extremely vital to us, however. We have had thrust upon us conditions which we had to meet and make the best of, that is, a large quantity of cheap oil. I have prepared a very careful and rather long paper, descriptive of the development of oil gas in California, and I presume that all of the gentlemen who care to know anything about the subject have read this paper, therefore, I will not read it.

I should like to call your attention to the physical and chemical changes that have been brought about through careful and studious experimenting on the Coast in the production of oil gas.

We have succeeded in producing a gas containing very much less hydrogen than the original oil gas. Our original gas as first made contained as high as 66 per cent. of hydrogen. We have succeeded in reducing that hydrogen content to less than 50 per cent. If there is 50 per cent. of hydrogen in the oil gas or more, the specific gravity of the gas is .4 or less; if there is 50 per cent. of the hydrogen in the finished gas or less, the specific gravity of the gas is .4 or more, so that we have raised the specific gravity of California oil gas from an unsatisfactory point (we will say .365) to over .45. Our only residual, lampblack, is taken from the gas in the washing box; it is washed out by water and is briquetted or used as lampblack and made into water gas. This admixture of water gas increases the carbon monoxide content from about 5 per cent. to 11 per cent., within the choice of the gas maker.

There is a comfort in making oil gas, granted that we have cheap oil; that is the convenience of the manufacture, the absolute ability to control labor conditions and the safety in operating with a small holder capacity, from which I know a great many of you have suffered on account of lack of capital to build big holders. In the city of San Francisco we have had just a few troubles, as you know—shivers of the earth, fires and so on—destroying some gasholders which could not be replaced in a few minutes. With a bank of oil gas generators, each capable of making 150,000 cubic feet of gas per hour, and some machines crowded to 4,000,000 cubic feet per day each, we have been able to get along with as low as 12 or 14 per cent. of holder capacity. Last winter our holder capacity was 30 per cent. of a 15,000,000-peak output. In some of the California towns under my management we now have as low as 16 per cent. of holder capacity, and it does not worry us a bit.

I have heard a great deal about the use of coal tar for treating roads, and its seems to me that if we had that coal tar out in California we would make gas out of it. I believe it is possible in modern oil gas apparatus. We are in the gas business, not that of selling tar. If we make tar, we find out why it is; if we make lampblack we use it for making water gas, and we have nothing but gas for sale. I had to buy a barrel of paint the other day to paint a stack. Lampblack, once a nuisance, which in its pasty, nasty form simply brought out suggestions from our friends that we would handle it in such and such a belt conveyor, or that we would pass it through a sieve of cheesecloth or iron mesh, is now handled with a locomotive crane and grab bucket, a clam shell bucket which will pick up a ½ to ¾ of a cubic yard at a time and put it where we want it. We have invented a briquetting press to make briquettes like the sample I have for your inspection. In that briquette at the present moment there is probably 18 to 20 per cent. of moisture, yet it feels perfectly dry to the touch. But we found that we were wasting money in making briquettes. We stack our lampblack with that locomotive crane, we let it drain by gravity, and after the water has run away from it until its water content is about 20 per cent., we dig into it as though it was a pile of anthracite coal, we put it into our water gas generators on specially prepared but not patented grates, blast it with about 9 inches of air pressure and make water gas. The use of water gas in connection with oil gas gives us a check on our candle power and on everything else that is required or desired by the gas consumer. With a water gas auxiliary we can use our lampblack residual. We can also regulate our candle power because we can get the volume of gas from our oil gas apparatus, and build up our candle power from the water gas side. We have made coke out of the lampblack, but we found we were wasting our money. Coke is very desirable and lampblack itself is coke. There is none better, only it is in such small particles that we do not recognize it as coke. But lampblack retorted, as you would retort coal, contains 98.8 per cent. of carbon. The remainder is a very small amount of sodium chloride, due to the scrubbing with salt water. We live out of doors in California, and we make our gas out of doors, we treat it out of doors, and when we have naphthaline troubles in California, instead of looking about for some method of punching a hole through it, and getting the gas to the consumer, we go to our works and find out why it is being made. In every case we find that there is a hole through our checkerwork somewhere; that there is a by-pass; that we are flooding our machines and the oil is being abused instead of being made into gas. By a little change, which may take a few hours, we get the machine back into working order and everything goes along smoothly. Of course, it is necessary for the engineer of the company to have a card passed over his desk every morning, showing the total number of complaints and their cause.

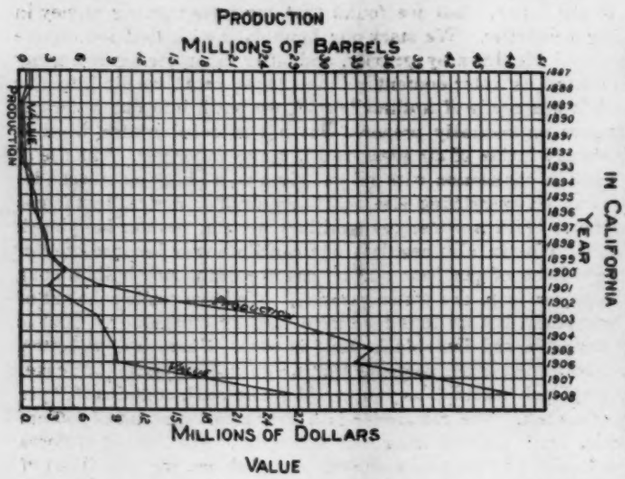
The various methods of distilling oil into gas in externally heated

vessels date back to the discovery of petroleum. In nearly all of these processes the oil was subjected to a comparatively low temperature in either iron or clay retorts, with unsatisfactory results attended by much trouble. Not until the introduction of generators and superheaters for water gas making was it attempted to decompose oil in contact with highly heated surfaces of refractory material in internally heated vessels. Then the oil was looked upon as an enricher of other gases and subservient to these diluent gases which took the name of water gas. The name of oil gas, with its unctuous suggestion, is apt to awaken unpleasant memories in the minds of the older generation of gas men, who experimented with the many ways of stewing oil in iron retorts. For this reason oil gas as well as water gas is badly named. The oil gas of California is so much like enriched coal gas that no chemist could identify it as having been made from oil.

The high price and scarcity of petroleum in the populous and large gas producing districts of the United States has probably deterred the invention and use of oil gas apparatus until the discovery of vast quantities of oil in California made it an economic necessity. The full extent of this necessity and the reasons for completely changing the method of making gas in California and abandoning all other generating apparatus will be better understood by referring to the following table, showing the quantity and value of petroleum produced in the State during the past 21 years, and a chart showing the relation of quantity to value.

Production of Petroleum in California.

Year.	Quantity, Bbls.	Value.	Value per Bbl.
1887	678,572	$1,357,144	$2.00
1888	690,333	1,380,666	2.00
1889	303,220	368,048	1.21
1890	307,360	384,200	1.25
1891	323,600	401,264	1.24
1892	385,049	561,333	1.45
1893	470,179	608,092	1.29
1894	783,078	1,064,521	1.35
1895	1,245,339	1,000,235	0.803
1896	1,257,780	1,180,793	0.90
1897	1,911,569	1,918,269	1.00
1898	2,249,088	2,376,420	1.05
1899	2,677,875	2,660,793	0.99
1900	4,329,950	4,152,928	0.95
1901	7,710,315	2,961,102	0.38
1902	14,356,910	4,692,189	0.32
1903	24,340,839	7,313,271	0.30
1904	29,736,003	8,317,809	0.27
1905	34,275,701	9,007,820	0.26
1906	32,624,000	9,238,020	0.28
1907	40,311,171	16,783,943	0.41
1908	48,306,910	26,566,181	0.54



Until 1884 coal gas was made exclusively in California from coals brought from Australia (as ballast for English wheat-carrying ships), and the coals from the State of Washington and Vancouver Island. The finding of oil in considerable quantities encouraged the making of water gas as an auxiliary to coal gas, so that in 1899 there were in California 1 crude oil water gas works, 10 Lowe carburetted water gas works, 18 coal gas works and 5 oil and air gas works.

This was the beginning of oil gas making and during that year 2,677,875 barrels of petroleum was produced in the State. For some years after this the production of oil doubled each succeeding year, and the difficulty of finding a profitable market for this enormous increase caused a corresponding drop in the price of oil. This was the incentive for displacing all other crude material for gas making, by oil.

To-day there are in California 56 oil gas works, and in connection with these are 3 plants for manufacturing water gas from the lampblack residual of oil gas making; 1 small coal gas works, and 1 oil and air gas plant.

The amount of petroleum produced in California during 1908 was 48,306,910 barrels.

The credit for discovering this new method of making gas and the invention of suitable apparatus for use in making it, belongs to Mr. L. P. Lowe, of San Francisco, who anticipated the eventual use of oil gas long before the plentiful supply of cheap oil warranted its commercial use on a large scale. He constructed several small plants in different parts of the State, and September 1, 1902, completed the erection and started an oil gas plant in the works of the California Gas and Electric Corporation in Oakland. This was the first adaptation of the new process to the supply of gas to a large city and was the basis of experiments from which the present oil gas apparatus has develop. Improvements made it possible to supply the entire output of Oakland September 11, 1904.

The first type of oil gas apparatus was constructed with the idea that extremely high heats for decomposing the oil produced the best results. It is, of course, understood that a generating apparatus consists of two or more shells filled with checkerbrick, and as there is no solid fuel used, there is an absence of fire boxes and grate bars found in the ordinary water gas generators. The checkerbrick are heated by oil injected under pressure with steam in company with a blast of air for combustion. No secondary air was used in the first types of apparatus, and it was quite impossible to control the heat in different parts of the machine. The oil for heating was usually injected at the bottom of the generator under an arch or series of arches.

There is a temptation to use arches in oil gas generators over the combustion chambers for supporting checkerbrick, but it was soon discovered that no arch can be constructed that will withstand the blow-pipe effect of the oil flame, and the most carefully constructed arches made of the best material obtainable lasted but a few days or weeks.

It was at first supposed that burning oil in a primary shell and passing the products of combustion over checkerbrick in a second shell without the use of secondary air coated the checkerbrick in the second shell with particles of lampblack deposited from the decomposed oil, and that during the succeeding run the steam admitted with the oil for gas making was converted into carbonic oxide and hydrogen in contact with these lampblack coated surfaces.

The high temperatures at first employed destroyed a large quantity of oil, resulting in a diminished yield of gas of but low candle power and the production of a large amount of lampblack, the yield of lampblack amounting to over 30 pounds per 1,000 cubic feet of gas made. As this lampblack was the result of decomposed hydrocarbons, the hydrogen which had been linked to this carbon remained in the gas as free hydrogen. Following is an analysis of early oil gas:

Heavy hydrocarbons	6.2	Carbonic acid gas	0.2
Marsh gas	25.6	Oxygen	0.4
Hydrogen	62.4	Residual nitrogen	2.2
Carbonic oxide	3.0		100,0

Specific gravity, .303. Net B.T.U.'s, 624 per cubic foot.

The candle power was 18.6. This gas was made in Oakland, Cal., in September, 1902, and is a fair sample of the oil gas of those days, which was produced in very highly heated generators with no means of regulationg the heat, without wasting it. This gas burned through an open tip had every appearance of coal gas of the same candle power, the flame being of the same size, but of apparently greater brilliance than coal gas. The small percentage of carbonic oxide is good evidence that little or none of the steam admitted with the oil was decomposed. This is borne out by the fact that carbonic acid gas was. 2 per cent. and as the gas was purified by oxide of iron none of the carbonic acid was removed by purification.

The low specific gravity .303 is, of course, due to the large percentage of hydrogen, and it is undesirable for the reason that there is a greater waste in use by consumers, and the increase of street main leakage is noticeable.

The specific gravity and hydrogen content bear so close relationship to each other that all oil gas containing 50 per cent. or over of hydrogen is of a specific gravity of .4, or under, and oil gas contain-

ing less than 50 per cent. of hydrogen has a specific gravity of .4, or over.

The high temperature in the generators created troubles about the same character and disagreeable qualities as those encountered where extreme high temperatures are used in regenerative coal gas benches.

Tar which under other conditions would have passed over to the scrubbers and been condensed in the ordinary way was made into pitch, which, mingled with the particles of lampblack, formed solid stoppages in the wash-box, so that it was no uncommon experience to make gas 20 hours 1 day, devoting 4 hours to cleaning the wash box and down-take pipe, while on the following day 20 hours would be devoted to cleaning the wash-box, with 4 hours' time remaining for gas making. The lampblack recovered as a by-product was made in such large quantities that after a generous amount of it had been used for firing boilers about the works, there remained a sufficient quantity to become a nuisance.

The lampblack as it is removed from the separators contains from 50 to 60 per cent. of water, and it is necessary to drain off the water until the water content is reduced to about 30 per cent. before the material is fit to be used as boiler fuel. The larger amount of water in the lampblack prohibits the use of any of the briquetting presses that are successfully used for briquetting other dry materials, or materials containing a small amount of binder.

To add to the discomforts of making gas in this way, the wash-box was so constructed that it retained a large amount of lampblack within itself, while the lampblack separator permitted large quantities of lampblack to overflow and be wasted. This waste was not deplored so much on account of the loss in money as from the fact that the drainage from the gas works was usually emptied into a river or bay, and the State Fish Commission complained of the pollution of the water. With these discouragements, and the meager amount of knowledge of the work actually being done, the construction of oil gas apparatus in large units for the supply of gas to cities to the exclusion of all other kinds of gas seemed dangerous and the task was unattractive.

Oil gas machinery had been constructed of all kinds and sizes with hardly two alike, and it first was necessary to design an apparatus applicable to both large and small works, and standardize every detail of it, thus accomplishing in 3 years the same results that have required 30 years of hard work with water gas apparatus.

The first important improvement was the eliminating of brick arches over the combustion chamber and the substitution of corbel work at the top of both generators in place of arches. To provide a combustion chamber without arches it was necessary to construct a pair of generators in the shape of a letter "U," one leg of the "U" being much longer than the other. The shorter of the two shells is used as a primary generator and the air blast is admitted downward through the center of the top of this generator.

At first the oil was fed through burners pointing downward through the top of the primary in the same direction as the air, but it was found that better results were obtained by placing the oil burners in a circle around the side of the generator near the bottom of the corbel work, thus injecting the oil at several points around the circle at right angles to the direction of the air. The top of the primary thus becomes a combustion chamber, and there is no sharp impact of oil flame against any part of the brickwork. To assist a proper understanding of the apparatus, a few illustrations have been prepared, these were photographed from working drawings of a modern and satisfactory oil gas set, as well as from apparatus now in operation.

Fig. 1 shows the arrangement of primary and secondary generators connecting at the bottom with a throat piece large enough, so that the passage for gas is not constricted. In this illustration the wash-box, which also acts as a hydraulic seal, and two ordinary steel scrubbers provided with wooden trays, are shown. The scrubbers are made a part of the illustration to emphasize the importance of ample scrubbing of oil gas.

Fig. 2 shows a vertical section of the generators with their linings, and Fig. 3 the arrangement of checkerbrick in the generators.

It will be noticed that the elbows for the admission of air and the outlet for gas are lined with firebrick to protect them from excessive heat.

Fig. 4 shows a 16-foot set with a capacity of 150,000 cubic feet per hour. This is called a 3,000,000-foot set and it will produce this amount of gas every day in the year and can be forced to over 4,000,000 cubic feet per day. There are now eight of these sets in operation in San Francisco and Oakland.

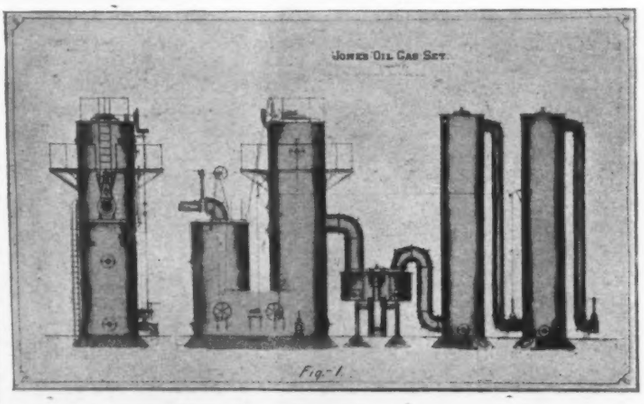


Fig. 1.

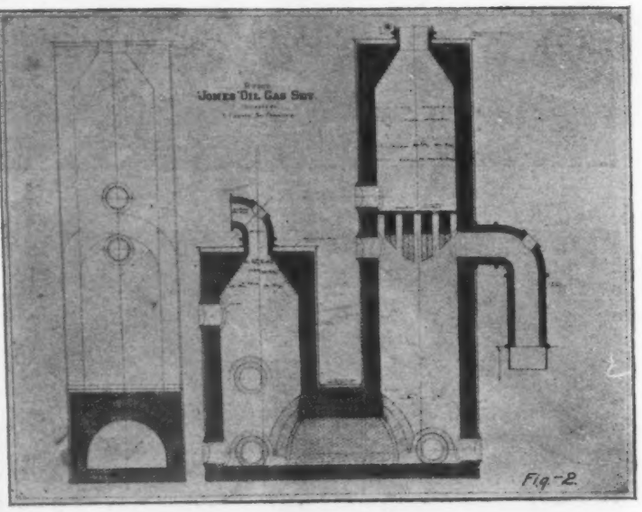


Fig. 2.

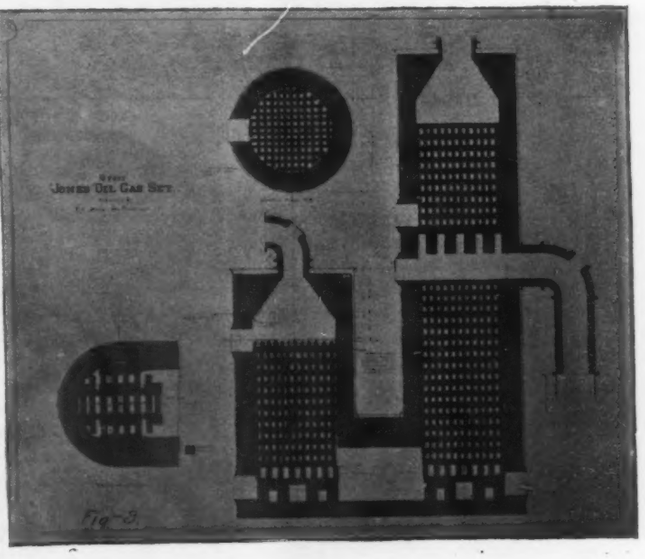


Fig. 3.

Fig. 5 is a picture of the operating table between two 16-foot sets, showing the convenience and simplicity of operation.

The sequence of operations in blasting and making gas, after the brickwork has been brought to a temperature that will ignite petroleum, begins by opening the stack valve at the top of the secondary generator. Opening the air blast at the top of the primary generator and admitting oil and steam through the heating burners at the top of the primary generators. The set is entirely operated from the floor, the gas maker and helper working in unison handling the stack valve, the primary and secondary blast valves, and turning on the oil and steam at the "Oil Table." The oil and steam for heating are admitted through a specially arranged burner shown in Fig. 6. Separate coils of pipe encircle the generator, one being for oil, and

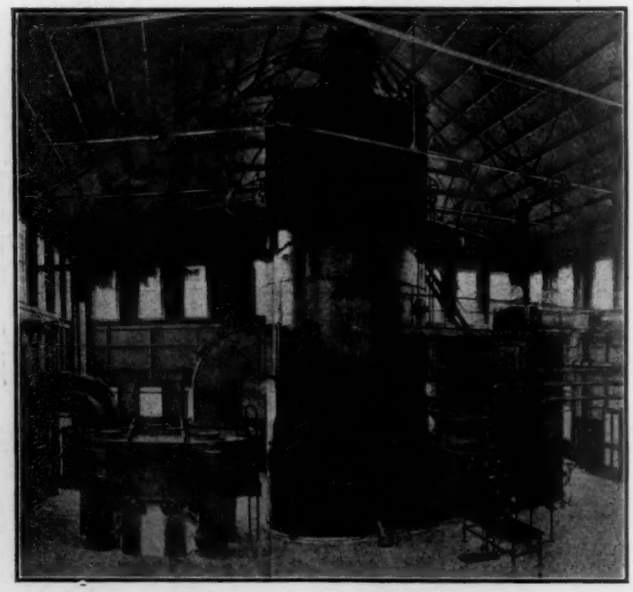


Fig. 4.

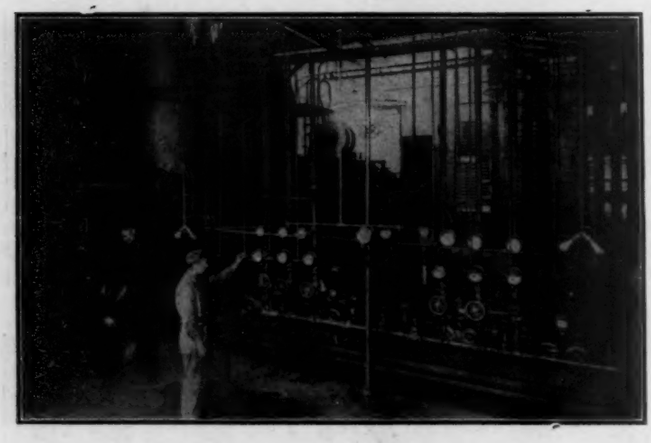


Fig. 5.

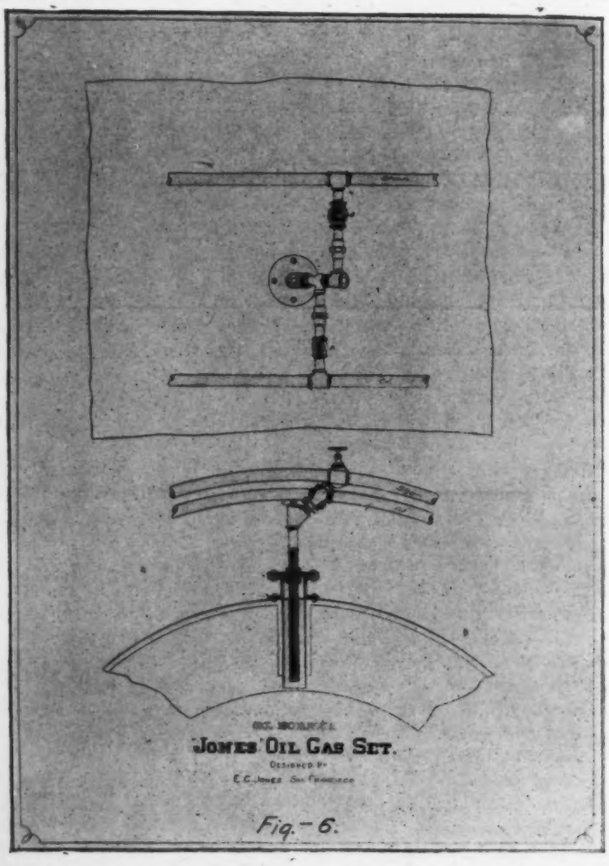


Fig.-6.

the other for steam, that for the oil always being at a lower level than the steam coil. This is a precaution to avoid a possible leakage of oil downward into the burners when the apparatus is not in use. Experience has proven that the straight pipe burner with open end gives better results in large sets than any other kind of a burner. Much care, however, has been devoted to the selection of an injector, which will force the oil through the burner into the generator, using steam in the most economical manner. This injector is made of brass, carefully finished, and the oil and steam openings are nicely centered. The straight pipe burner is connected to the shell of the generator through a flange, and on the outside end of the burner is placed a "Y" fitting. The injector is attached to this "Y" fitting, connecting it with the steam and oil pipes. This arrangement does not interfere with the working of the injector, and has the advantage of leaving a straight way for cleaning the burner with a small rod through the plugged end "C," without disturbing the rest of the burner mechanism.

A regulating service cock is placed on the oil inlet and a standard globe valve "B" on the steam inlet to insure good regulation at the burner. These controlling valves require nice adjustment for the exact proportion of oil and steam, so that when once set the amount of oil and steam used for heating and making is controlled from the oil table.

A glance at the oil table (Fig. 5) shows an oil meter for the heating oil, and one for the oil used for making gas. Gauges are provided for showing the steam pressure at the boiler, and the oil pressure at the outlet of the oil heater. In addition to this there are 6 nozzle gauges used in connection with each set. Three for steam and three for oil. These gauges are connected to the oil and steam pipe between their respective throttle valves and the machine, so that these gauges practically become steam and oil meters for the guidance of the gas maker.

The oil table is also provided with thermometers, a jet photometer and test light. The oil is heated to about 150° F. in a tubular oil heater of well known design. There are 9 burners for heating at the top of the primary generator. Assuming that the machine has been making gas and a blast is about to begin, and the stack valve has been opened and the air is turned on at the blast valve, no oil is admitted to the machine during the first 3 minutes of the blast, and the steam on the burners is turned on to a sufficient pressure to keep them clean and protect them against overheating, the blast pressure inside of the primary generator being 9 inches. At the end of the third minute oil is turned into the primary generator at a pressure of 8 pounds inside of the machine while the steam pressure is retained at 35 pounds, and the blast pressure is reduced to 7 inches also within the machine.

The following table shows the progress of the blast on the 16-foot set:

Generator No. 2 Jones, Monday, July, 26, 1909.

Min.	Oil Temp. Fah.	Oil Pressure to Heat, Pounds.	Steam Pressure to Heat, Pounds.	Oil to Heat, Gallons.	Blast Pressure, Inches.
1st.....	....	..	35	blow	9
2d.....	....	..	35	"	9
3d.....	....	..	35	"	9
				3.25	
4th	150	8	35	3.25	7
				3.50	
5th	150	8	35	3.50	7
				3.25	
6th	150	8	35	3.25	7
				3.50	
7th	150	8	35	3.50	7
				3.25	
8th	150	8	35	3.25	7
				3.50	
9th	150	8	35	3.50	7
				3.25	
10th	150	8	35	3.25	7
				3.25	
11th	150	8	35	3.25	7
				3.25	
12th	150	8	35	3.25	7
				60.00	

The duration of the blast in the large machines is 12 minutes; 3 minutes without and 9 minutes with oil.

At the end of the heat the blast valve is closed and a quick opening valve at the outlet of the first scrubber is opened by means of a winch attached to the generator and a wire rope running over pulleys to the valve stem. This valve is opened during runs and closed during heats, for the purpose of isolating the set from the rest of the works during the heating process, and to permit the use of high blast pressure without breaking the seal in the wash-box, thus sending oil producer gas through the wash-box and scrubbers. As the man on the floor turns off the blast, opens the scrubber valve and closes the stack valve, the gas maker does not shut off the heating oil, he first turns on the oil and steam to the gas making burners, which are separate and distinct from the heating burners, and then shuts off the oil and steam from the heating burners, so that there is no interruption in the making of gas, the heating oil serving for this purpose during the moment necessary for changing the valves. The temperature of the primary and secondary generators is observed by means of sight cocks, the gas maker becoming very skillful in detecting changes of color in the checkerbrick and turning on secondary air when the outgoing stack gas has the appearance of containing combustible gas.

In this connection the personal factor represented by the skill of the gas maker enters more largely into the equation of good results than in either coal or water gas making. For making gas the oil and steam is first turned into the top of the primary, the oil is decomposed by passing downward through the checkerbrick in the primary generator, thence through the connecting throat piece and up into the secondary generator. Should the gas thus made be permitted to traverse the entire length of the secondary generator to the top, the illuminants would be partly decomposed by breaking down into marsh gas, hydrogen and lampblack. To prevent this overheating and protect the gas, the outlet of the machine is placed at or near the middle of the secondary generator. Above this point there is a large amount of heat stored in checkerbrick placed upon a number of arches, sprung across the generator. These arches are durable, because there is no direct combustion of oil in proximity to them. To make use of the heat in the top of the secondary generator, coils of steam and oil pipes are connected with 18 burners in the corbel work at the top of the secondary; 15 of these burners are used for making gas, while 3 are steam pipes for purging. The gas thus made passes downward and through the side outlet into the wash-box. It will thus be seen that gas is made in two directions, leaving the machine through a common outlet. The reasons for this are obvious.

During the process of heating it is sometimes difficult to so regulate the temperature in the primary and secondary generators even if the checkerbrick in both generators are in equally good condition for breaking up the oil, and if the gas was taken off at the top of the secondary, it would be impossible to so regulate the heat that no oil would be wasted, gas overheated, or the yield of gas per minute reduced. By adopting the side outlet all heat is conserved; if the top of the secondary is overheated more oil is used in that part of the machine, and if the primary is at too low a temperature less oil is used in the primary. In this way all heat is used for gas making and practically none is wasted, at the same time a uniform quality of gas is maintained.

One of the best indicators of the quality of gas being made is the condition of the overflow water from the wash-box and first scrubber. The presence of tar in the wash-box seal shows that the heat is too low and lampblack in the overflow from the first scrubber shows that the heat is too high.

The following table shows the amount of oil used in gallons, in different parts of the set, together with the steam and oil pressures, all pressures being on the inner side of the throttle valves and within the machine. These figures were taken from the run after the foregoing heat, the duration of the run was 10 minutes. Oil is admitted to the top of the primary, beginning with 26 gallons per minute and reduced to 9 gallons during the 8th minute. Oil is admitted to the top of the secondary, beginning with 39 gallons, during the first and ending with 12 gallons during the 8th minute. The steam pressure remains constant during 8 minutes of the run. At the end of the 8th minute the oil is shut off from the primary and secondary and the steam pressure on the primary and secondary is raised to 110 pounds, and allowed to remain at this pressure for the last 2 minutes of the run for the purpose of purging the machine. For purging the machine during the last 2 minutes of the run, 3 special open steam pipes are used at the top of the secondary, steam is maintained on the burners at the top of the primary and secondary and a 1-inch steam pipe admits steam to the bottom of the primary directly opposite the throat piece; this is also for the purpose of clearing the machine.

Make of Gas, July 26, 1909.

Min.	Oil Temperature, Fah.	Oil Primary Gallons to Make.	Oil Secondary Gallons to Make.	Oil Pressure Primary Lbs.	Steam Pressure Primary Lbs.	Oil Pressure Sec. Lbs.	Steam Pressure Sec. Lbs.	Boiler Steam Pressure. Lbs.
1....	150	26	39	21	25	27	35	110
2....	150	26	39	21	25	27	35	110
3....	150	18	26	19	25	24	35	110
4 ...	150	18	26	19	25	24	35	110
5 ...	145	18	26	19	25	24	35	110
6....	145	17	26	19	25	24	35	110
7....	145	17	26	19	25	24	35	110
8....	145	9	12	19	25	24	35	110
9....	140	purge	purge	..	110	..	110	110
10....	140	purge	purge	..	110	..	110	110

Following are two analyses of gases taken at the stack valve at the middle of the heating period.

Jones Set No. 2.

Carbonic acid	13.1 per cent.
Oxygen	1.9 "
Nitrogen	85.0 "

Jones Set No. 1.

Carbonic acid	15.3 per cent.
Oxygen	0.2 "
Nitrogen	84.5 "

These analyses are frequently taken to determine the ratio of air to heating oil: Six per cent. of carbonic acid indicates 3 times the theoretical amount of air required; 9 per cent. of carbonic acid indicates 2 times the theoretical amount of air required; 17 per cent. of carbonic acid indicates 1 time the theoretical amount of air required. (Experiments at Munich, 1880, Stillman's Engineering Chemistry.)

The following table gives the make of gas per minute for a series of 5 runs. These were of necessity taken on different days for the reason that the gas was carefully measured in a relief holder isolated for the purpose and careful corrections for temperature were made to avoid error in measurement. The amount of oil used for heating and making, and the total oil used per 1,000 feet of gas, are given in this table. The make of gas per minute during a 10-minute run is a good indication of the application of the heat contained in the checkerbrick in the making of gas, and an index to the proper length of the run.

Test Runs on No. 2 Jones' Set.

Min.	July 9.	July 10.	July 10.	July 12.	July 12.	Average.
1st	7,080	6,664	5,206	8,538	7,497	6,997
2d	6,247	7,705	6,872	6,664	9,371	7,372
3d	6,039	7,080	7,082	8,333	7,497	7,206
4th	5,831	6,664	6,247	8,225	7,393	6,872
5th	5,623	6,248	6,248	6,248	6,664	6,206
6th	5,623	6,248	6,247	6,351	5,831	6,060
7th	5,415	6,664	6,248	6,559	6,768	6,331
8th	4,790	2,915	4,165	3,748	3,540	3,832
9th	2,707	2,290	2,082	1,978	2,291	2,270
10th	2,082	1,042	2,082	1,874	833	1,583
Totals	51,437	53,520	52,479	58,515	57,685	54,729
	Gals.	Gals.	Gals.	Gals.	Gals.	Gals.
Heat oil	70	70	70	70	70	70
Make oil	370	373	370	370	400	377
Total oil	440	443	440	440	470	447
Oil per 1,000	8.55	8.28	8.38	7.53	8.13	8.17

Following is a table giving the analyses of the gas made during a run made on July 9, 1909. Samples of gas were taken from the wash-box at the end of the 2d, 5th and 7th minutes and analyzed.

Analysis of Foregoing Make—Jones' Set No. 2.

	End of 2d Min.	End of 5th Min.	End of 7th Min.
Carbonic acid gas.	1.6	0.8	0.4
Illuminants	3.4	6.6	9.0
Oxygen	0.2	0.2	0.0
Carbonic oxide	9.4	8.0	6.6
Hydrogen	53.2	50.6	44.8
Marsh gas	28.5	30.9	35.0
Nitrogen	3.7	2.9	4 2
B.T.U. per cubic foot	589.0	665.0	732.0
Specific gravity	0.382	0.391	0.423

Following are the results of a typical run giving the amount of gas made, oil used and an analysis of the gas taken at the outlet of the wash-box during the 1st minute when all the gas was made in the primary generator, and during the 2d, 5th, 7th and 10th minutes.

POTRERO, June 4, 1909.

Result of analyses of samples taken at outlet of wash-box of No. 3 Jones Set:

	Pri.	2d.	5th.	7th.	10th.
Carbonic acid	1.8	1.3	0.0	0.0	0.0
Illuminants	8.6	2.1	5.0	5.8	7.8
Oxygen	Tr.	Tr.	Tr.	Tr.	Tr.
Carbonic oxide	5.6	20.2	9.4	8.2	14.6
Hydrogen	31.7	44.1	46.6	44.9	47.4
Marsh gas	43.4	26.7	35.7	37.3	25.9
Nitrogen	8.9	5.6	3.3	3.8	4.3
B.T.U.	765.0	549.0	675.0	698.0	747.0
Specific gravity	0.514	0.469	0.402	0.411	0.435

Min.	Cubic Feet.	
1st	6,625	
2d	5,833	
3d	6,041	Oil 320 gallons
4th	5,625	to make, 60 gal-
5th	5,416	lons to heat, 380
6th	5,000	gallons total.
7th—7½ min. pri. oil off	4,373	8 25 gallons per
8th—8th " sec. " "	4,166	1,000 cubic feet.
9th	3,125	
10th	833	
Total	46,041	

The percentage of carbonic oxide in these analyses would lead to the conclusion that the carbonic oxide is not formed by contact of steam and the carbon remaining in the generators after a heat.

It will be noticed that the gas made in the primary generator at the beginning of the run contains 5.6 per cent. of carbonic oxide, while during the second minute it increases to 20.2 per cent. and then drops to less than half that amount during the 5th and 7th minutes, rising again to 14.6 per cent. during the 10th minute. The carbonic oxide is undoubtedly produced by the dissociation of steam in contact with incandescent particles of lampblack, which have been thrown down by the breaking down of hydrocarbons.

It is now a well understood fact that the oxygen of steam will not unite with carbon in combination with hydrogen, so that neither carbonic acid nor carbonic oxide is generated directly from the hydrocarbons of the oil in contact with steam, it being first necessary to convert the oil into gas or hydrocarbon vapor and then break down the hydrocarbons into lampblack and hydrogen. This lampblack becoming incandescent will unite with oxygen of steam. The high percentage of nitrogen in the primary gas is probably due to the presence of a small amount of products of combustion remaining in primary generator after the heat. This nitrogen diminishes to the 5th minute and then increases to 4.3 per cent. during the 10th minute.

California petroleum contains over 1 per cent. of nitrogen, usually 1.1 per cent. This is twice the amount of nitrogen contained in the petroleum of Pennsylvania and West Virginia. In distilling California petroleum the third fraction taken off between 200 and 250° C. has a strong odor of ammonia. This ammonia is destroyed in the gas generators at higher temperatures, appearing in the gas as nitrogen and hydrogen.

To further determine the part played by the steam admitted with the oil three runs were made on a 16 foot set, first in the ordinary way, second with oil injected under its own pressure without steam, and third by steam without the use of any oil. In each case after the generator had been heated ready to make gas.

	Ordinary Run.	All Oil.	All Steam.
Carbonic acid	0.4	0.4	43.8
Illuminants	5.2	6.2	0.0
Oxygen	0.1	0.1	0.2
Carbonic oxide	7.0	5.3	10.6
Hydrogen	46.6	47.9	5.0
Marsh gas	30.6	36.7	0.0
Nitrogen	5.1	3.4	40.4
Specific gravity	0.404	0.388	1.168
B.T.U. per cubic foot	668.302	700.746	53.55

Ordinary Run—Same gauge pressure as combined oil and steam runs; 17-inch pressure inside machine, 47 gallons per minute. All Oil Run—18 pounds to 19 pounds oil pressure on primary, 25 pounds to 27 pounds oil pressure on secondary; 21-inch pressure inside machine, 51 gallons per minute. All Steam Run—25 pounds pressure on heat burners; 26 pounds pressure on primary make burners; 32 pounds pressure on secondary make burners. Pressure machine, 10 inches to 11 inches (inside).

The run made with all steam cannot be directly compared with the other two runs, as very little gas was produced, barely enough to enable the taking off of a sample at the wash-box. The generator during this period was at the same temperature as during ordinary runs, that is, at a temperature high enough to decompose steam in the presence of incandescent carbon and only 10.6 per cent. of carbonic oxide was produced. Had there been much carbon deposited on the checkerbrick this generator would have been in ideal condition for the manufacture of "blue" water gas.

A word in regard to the California petroleum from which this gas is made. The crude petroleum from 12° to 17° B. is best adapted to the purpose of making gas. This oil has an asphaltum base, which is true of most of the petroleum produced in California and this makes it in a measure unattractive to oil refiners. The oil which was used during the experiments here recorded was 15.8° B. at 60° F. Distillation began at 85° C.

Fractional Distillation of California Crude Petroleum. 15.8° B. at 60° F. Distillation begins 85° C.

	Fraction.	Color of Fraction.
No. 1....Below 150° C.	5.0 pr. ct. 2½ pr. ct.	Water yellowish.
No. 2....150°-200°	4.0	Yellow.
No. 3....200°-250°	27.5	Lemon. H,S and NH_3.
No. 4....250°-300°	14.0	Lemon.
No. 5....Above 300° C.	39.5	Red.
No. 6....Coke	8.0	Black.
Loss	2.0	
	100.0	

Flash point, 257° F. Fire test, 293° F. After the 300° fraction comes off the temperature rises immediately to above 380° C.

The ultimate analysis of oil taken from this same field is:

Carbon	85.0 per cent.	Oxygen	1.0 rer cent.
Nitrogen	1.0 "	Hydrogen	12.2 "
Sulphur	0.8 "		

100.0 by weight.

The exact amount of sulphur in the oil used for these experiments was 0.93 per cent.

Oil containing sulphur in quantity below 1 per cent. will produce gas which may be satisfactorily purified by ordinary oxide of iron. Should the percentage of sulphur exceed 1 per cent. purification becomes difficult unless there is a large purifying capacity provided for it. Crude oils in California in some instances contain as much as 4 per cent. of sulphur, but it is better not to purchase oils containing so much sulphur than it is to provide elaborate and expensive means for purifying the gas. It is fortunate that the most available crude oils produced in greatest abundance and best adapted to oil gas making have a small percentage of sulphur. After these crude oils are distilled and the distillates are sold for gas manufacture the distillate contains all of the sulphur of the crude oil condensed into the lesser quantity of distillate. It is the opinion of the writer that a crude petroleum from 14° to 16° B. is the oil which gives the best results in oil gas making. In other words, the more pounds in weight to the gallon of oil the greater will be the production of gas, and there will be less waste of oil. This is diametrically opposed to good water gas practice, but the conclusion has been reached after use in practice and experimentally of crude oils from 8° B. to 37° B. and distillates from 20° B. to 42° B.

The Wash-Box.—The wash-box serves a double purpose as a hydraulic seal and as a piece of apparatus in which nearly all of the lampblack is separated from the gas and held in suspension in the water. The early forms of wash-boxes were comparatively of small dimensions and were filled with baffle plates and partitions, forming excellent lodging places for lampblack, so that the cleaning of the wash-boxes was an important part of the gas maker's daily work. In the development of a self-cleaning wash-box to take care of the amount of lampblack made by a 16-foot set it became necessary to depart from the square or circular form and adopt an oval shape, having a superficial area of 265 square feet, also to depart from the usual custom of connecting the generator to the wash-box and the wash-box to the scrubbers with pipe of the same or even smaller diameter than the trunk mains in the gas works. Allowance is made for the expanded condition of the hot gas leaving the generator and in what is known as a 24-inch gas works the inlet and outlet pipes to the wash-box are 48 inches in diameter, while the diameter of the dip pipe in the wash-box flares to 68 inches. This removes one of the chief causes of back pressure and enables the hot gas to easily get away from the machine.

In the new form of wash-box there are no partitions or diaphragms and the space within the box is clear. The gas enters through a dip pipe at one end and passes out through an outlet pipe from the top of the wash-box at the other end. Two large overflows on the side of the wash-box carry away the lampblack. The self cleaning principle of this wash-box consists in constant agitation of the water in the box; this is done by dividing the main water supply into a number of 1-inch pipes 12 in all, extending to within 3 inches of the bottom of the wash-box. The water is thus forced downward to the bottom of the box and rises to the overflow. The lampblack is washed out of the gas by this turbulent water and is carried out of the box before it has an opportunity to settle. The average temperature of the water entering the wash-box is 61° F., and the average temperature of the water leaving the wash-box is 129° F. The temperature of the gas leaving the wash-box is 142° F., and the amount of water used in the wash-box is 46 gallons per 1,000 cubic feet of gas. The lampblack and water pass from the wash-box through open drains to the lampblack separator.

Scrubbing.—Thorough scrubbing of oil gas is all important and it has been proven conclusively that it is better to treat oil gas directly with a large quantity of water than to use the methods of condensing and scrubbing as applied to coal gas, where valuable by-products must be removed. Oil gas requires more water for scrubbing than any other kind of gas on account of the finely divided particles of lampblack held in suspension in the gas, and these must be removed, as they would tend to destroy the purifying material, and should the lampblack pass through the purifiers it would cause endless trouble by stoppages. One uniform kind of scrubber and method of filling it has been adoped. The old-style cylinder filled with trays through the top is the best to be had, but the filling should be carefully done. The trays are made of 1-inch by 6-inch pine lumber surfaced on four sides and nailed together in sections with spacing pieces 1 inch thick,

also made of surfaced lumber. These trays are made in sections small enough to go through a door on the top of the scrubber. Each alternate layer of trays is placed at right angles to the one immediately under it, and the entire shell is filled without voids of any kind. As these trays are made somewhat smaller than the inside diameter of the steel shell in order to provide for easily getting the trays in and out, and for the swelling of the wood, it is essential that the space between the trays and the shell shall be caulked with excelsior, so that the gas cannot pass around the trays instead of through them, or the water flow down on the inside of the shell. In this way the gas is compelled to pass up through the trays, meeting smooth wet surfaces, and the water passes evenly downward through the trays; thus the maximum efficiency is obtained by the use of the smallest amount of water.

Fig. 7 shows a plan of a scrubber tray and the arrangement of the

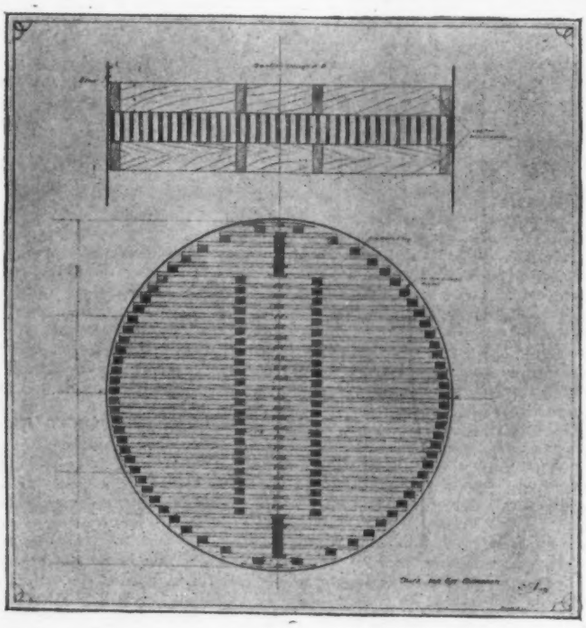


Fig. 7.

trays in the scrubber. In the larger works there are 3 scrubbers 12 feet 7 inches in diameter by 40 feet high, and the water is supplied to them through 10 sprays passing through the top head. In this connection with each 16 foot apparatus the amount of water used is approximately 15 gallons per 1,000 cubic feet of gas per scrubber, or 45 gallons per 1,000 cubic feet for the complete scrubbing of the gas. Salt water is used in the wash-box and in all scrubbers. It gives satisfactory results, having no deteriorating effect upon the gas or the scrubbing apparatus. It has the further advantage, where gas works are located on tide water, of being used in abundance at small cost for pumping, and wasted after it has been used. In small plants where water is scare or expensive, it becomes necessary to be more saving in the use of water, and in some cases to cool the water and use it over again.

The Lampblack Separator.—The overflow water containing lampblack flows from the wash-box through open, exposed drains into the lampblack separator, and in nearly all oil gas works the overflow water containing tar from the scrubbers flows into the same separator. The amount of tar is so inconsiderable that it is seldom recovered for sale, but mixed with the lampblack it adds somewhat to its fuel value and acts as a binder in briquetting.

Separators of small dimensions and containing many partitions have been superseded by those of much larger dimension with fewer partitions; experience with the separating of lampblack from water has developed the fact that the greater the area of the separator, and consequent slower speed of bow of water, the more thoroughly is the lampblack separated from the water.

The lampblack and water first empties into a separator provided with a constantly moving skimmer, consisting of pieces of 1 by 3 oak fastened to sprocket chains. The light fluffy lampblack rising to the surface of the water is skimmed off by these scraping pieces and taken through a trough to a height of about 25 feet, and emptied into a settling tank, the walls of which are made of dry lampblack in the form of a crater of a volcano. After this skimming process the water flows into a separator as shown in Fig. 8.

This is a picture of a separator recently installed and capable of separating lampblack from the water used in the manufacture of 12,000,000 feet of gas per day. In this separator there is a single partition running longitudinally; this partition is provided with a skimmer extending below the surface of the water. The separator is made in two sections to enable the alternate cleaning and use of the sections. The water containing lampblack flows into one of the large pits and the separation is accomplished by the settling of the lampblack particles through the water. This is of necessity slow, because

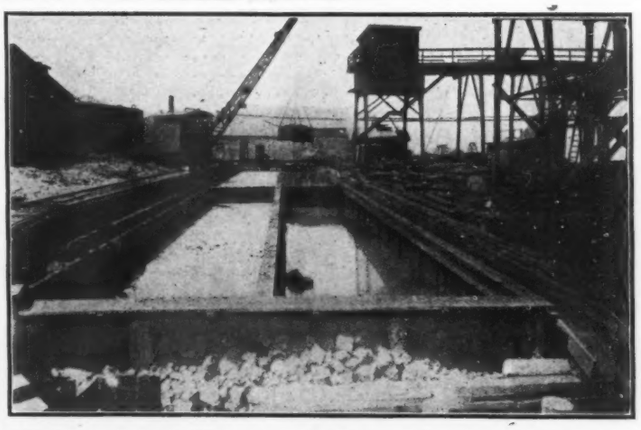


Fig. 8.

the specific gravity of the lampblack is so nearly like that of water. The water passes under the skimmer and over the partitions into the next pit, where further settling takes place; out of this pit the clarified water passes through an open flume and is wasted. When the two pits are filled with lampblack the water gates are opened into the next pair of pits and the water is shut off from the pits filled with lampblack. The removal of the lampblack is then performed by means of a locomative crane and clam shell bucket. The water-socked lampblack thus removed is deposited in a pile and allowed to drain. After it has drained until there is about 30 per cent. of water remaining in it, it may be used as boiler fuel. This was the only use to which lampblack was put in the early days of oil gas making and attempts were afterwards made to make briquettes of the substance for domectic use. This proved difficult on account of the large amount of water contained in what seemed to be comparatively dry lampblack, and it was found that the only simple and practicable method of briquetting was by the use of a plunger operated by a crankshaft for forcing the lampblack into an open cylindrical mould, thus forming an endless briquette, after the manner of a sausage machine. These briquettes would break by their own weight in lengths which were multiples of the length of a stroke, that is, if the stroke of the machine is 1½ inches, the briquettes would break off in lengths of 3, 4½ or 6 inches. This method was found to be slow and expensive, and a vertical press was invented which had 4 plungers arranged on one shaft. The lampblack was fed through a trough into 4 moulds and pressed by the plungers into and through these moulds, breaking off into pieces in the same manner as described above with a single horizontal press. This vertical press produced 50 tons of briquettes in 24 hours. The briquettes were 3 inches in diameter, weighed 5¼ ounces per lineal inch, or 82½ pounds per cubic foot. They are smooth on the outside and possess cohesion enough to permit of ordinary handling. The only binder used in the making of these briquettes was the normal amount of tar flowing from the scrubbers into the lampblack separator. The briquettes were apparently dry when made, but still contained a considerable quantity of water.

Following is an analysis of a briquette after it had been stored for 1 year in a dry place:

Moisture	8.5	Fixed carbon	79.9
Volatile matter.....	10.8	Ash	0.8
			100.0

These briquettes are an ideal fuel, particularly for use in open grates, and, owing to the small percentage of ash, the briquettes when once ignited remain at a glowing heat until they are entirely consumed. The only objection to the use of them is the strong odor of naphthaline which they possess and which does not entirely disappear after storage for a long time.

In order to avoid the inconvenience of dealing in by-products, it was decided to make the experiment of using lampblack briquettes as a substitute for anthracite coal in water gas generators. In a station contiguous to the Potrero plant in San Francisco there were 6 sets of double superheater Lowe water gas apparatus with a rated capacity of 1,000,000 cubic feet each. Briquettes were used in these sets with some success, but the capacity of the sets was reduced 50 per cent. by using lampblack; that is to say, no more than 500,000 cubic feet of gas could be made in a day with a set rated at 1,000,000 cubic feet.

The making of gas in this way, however, had decided advantages, as there was an entire absence of clinker and it required very little time to clean the fires. Contrary to expectations, the air pressure required to blast through lampblack was extremely low, never exceeding 9 inches. The average amount of lampblack used per 1,000 cubic feet of gas, covering a period of 6 months, was 39.86 pounds, and the oil used for enriching was 6.8 gallons per 1,000. This was the ordinary 14° to 16° crude oil, with asphaltum base. The candle power ranged from 28 to 33 candles. At that time the gas supplied to San Francisco was 23-candle power, and the oil gas which was made in the large generators was 19 candle power, so that the candle power of the oil gas was raised by mixing about 24 per cent. of the high candle power lampblack water gas with it.

A typical analysis of the lampblack water gas is as follows:

Heavy hydrocarbons	16.5
Marsh gas	32.8
Hydrogen	24.6
Carbonic oxide	13.7
Carbonic acid gas	6.2
Oxygen	0.2
Residual nitrogen	6.0
	100.0
Specific gravity	0.647
Net B.T.U.'s per cubic foot	814.0
Candle power	28.5

A lampblack fire is apt to flue during the blast and it requires some care to keep the fuel bed in condition, as shown by the amount of carbonic acid in the gas produced.

In using the lampblack the ordinary round grate bars are placed ½ inch apart, and great care is necessary not to overheat the superheater and thus make lampblack in the water gas apparatus. During the heavy demand for gas last winter the use of lampblack exceeded the capacity of the single briquetting press, and it became necessary to use lumps of lampblack dug from the side of a pile of dry material. These lumps were of about the same size as the coarse anthracite coal ordinarily used and were broken away from the pile with pickaxes. It was found that the lumps held their shape fairly well in the generator and gave fully as good results as briquettes. Lump lampblack was substituted for briquettes in all the generators, thus saving the cost of briquetting and considerably reducing the cost of lampblack water gas.

Following is a recent analysis of the lampblack used in generators:

Volatile matter, including moisture	34.15 per cent.
Fixed carbon	65.80 "
Ash	0.05 "
	100.00 "

The first lampblack water gas was made July 14, 1906, and this gas has been made continuously without the use of other fuel in the generators since May 5, 1907.

The improvements in oil gas manufacture described in this paper have made it possible to regulate the amount of lampblack produced, so that a combination of oil gas and lampblack water gas plant will produce only enough lampblack for boiler fuel and generator fuel with no product remaining for sale, excepting gas. The amount of lampblack now produced in the largest oil gas sets is 20 pounds per 1,000 cubic feet of gas.

For the purpose of showing the average composition of oil gas, lampblack water gas, and the mixed gas now made and distributed in San Francisco, the following series of 10 analyses each, from June 11th to June 22d, inclusive, are given. These analyses were taken at random during each of the above dates and the average of these is a good criterion of the composition of the gas.

Analyses of 10 *Samples of Crude Oil Gas and Average Analysis.*

June.	CO_2	C_nH_{2n}	O	CO	H_2	CH_4	N_2	C. P.	B.T.U.	Sp. Gr.
11	2.5	7.1	0.2	9.2	40.5	33.8	6.7	18.4	675.0	.479
12	2.5	7.0	0.2	9.3	37.8	35.8	7.4	22.2	686.0	.495
14	2.4	8.0	0.2	9.4	40.0	33.3	6.7	21.2	687.0	.485
15	2.8	6.2	Tr.	9.4	39.0	35.4	7.2	18.5	670.0	.487
16	2.2	6.8	0.2	8.8	40.1	35.5	6.4	20.8	685.0	.474
17	2.4	7.0	0.2	8.4	42.8	34.2	5.0	18.8	683.0	.456
18	2.4	7.0	0.2	9.4	38.7	35.1	7.2	18.7	681.0	.489
19	3.0	7.2	Tr.	9.8	39.1	34.7	6.2	19.7	684.0	.490
21	3.0	6.8	0.4	9.4	40.2	33.5	6.7	18.4	665.0	.481
22	3.0	7.0	Tr.	9.0	39.6	35.1	6.3	20.2	683.0	.484
Av.	2.62	7.01	0.16	9.21	39.78	34.64	6.58	19.69	679.9	.482

Analyses of 10 *Samples of Carburetted Water Gas and Average Analysis.*

June.	CO_2	C_nH_{2n}	O_2	CO	H_2	CH_4	N_2	C. P.	B.T.U.	Sp. Gr.
11	5.6	17.0	0.2	14.0	26.0	31.6	5.6	32.5	816.0	.636
12	5.6	16.8	0.2	13.4	23.8	34.7	5.5	32.2	836.0	.643
14	5.4	17.0	Tr.	13.6	27.0	32.0	5.0	33.1	822.0	.624
15	6.0	17.0	Tr.	13.0	25.6	33.6	4.8	30.5	833.0	.633
16	5.6	16.2	Tr.	13.6	24.4	33.4	6.8	29.1	812.0	.643
17	5.7	16.3	Tr.	13.2	25.2	33.5	6.1	29.5	817.0	.635
18	6.0	16.0	Tr.	13.0	25.3	33.6	6.1	28.3	812.0	.636
19	5.8	16.0	Tr.	14.2	24.9	32.0	7.1	28.8	797.0	.645
21	5.5	15.5	0.2	13.8	25.3	32.5	7.2	30.3	793.0	.638
22	6.0	16.0	Tr.	14.0	23.5	34.1	6.4	30.4	814.0	.650
Av.	5.72	16.38	0.06	12.58	25.10	33.10	6.06	30.47	816.2	.638

Analyses of 10 *Samples of Mixed Crude Oil Gas and Carburetted Water Gas and Average Analysis.*

June.	CO_2	C_nH_{2n}	O_2	CO	H_2	CH_4	N_2	C. P.	B.T.U.	Sp. Gr.
11	3.4	9.2	0.4	11.0	37.2	32.9	5.9	21.8	703.0	.518
12	3.5	9.7	0.4	9.8	36.6	33.2	6.8	22.9	710.0	.522
14	3.4	10.2	0.4	10.0	36.3	33.6	6.1	22.9	724.0	.523
15	4.0	10.0	0.4	10.6	35.8	32.5	6.7	21.4	708.0	.535
16	3.5	9.3	0.4	10.2	38.3	31.9	6.4	21.6	696.0	.512
17	3.4	9.6	0.2	10.0	36.7	34.6	5.5	20.9	724.0	.515
18	3.6	10.0	0.4	10.0	37.2	32.3	6.5	21.5	709.0	.521
19	4.0	9.6	0.2	10.6	34.5	34.0	7.1	22.1	712.0	.540
21	3.8	9.7	0.2	10.0	35.6	33.7	7.0	21.7	712.0	.531
22	3.7	9.7	0.4	10.2	37.2	32.9	5.9	22.0	710.0	.519
Av.	3.63	9.70	0.34	10.24	36.54	33.16	6.39	21.88	710.7	.5236

The Amount Made and Per Cent. of Oil Gas and Water Gas Which Constitute the Above Analyses.

June.	Oil Gas Made 1,000.	Water Gas Made 1,000.	Per Cent. Oil Gas.	Per Cent. Water Gas.
11	6,921	2,095	77	23
12	7,094	2,089	77	23
14	6,664	2,090	77	23
15	6,522	2,090	76	24
16	7,054	1,975	78	22
17	5,976	2,102	74	26
18	6,072	2,102	74	26
19	6,718	2,077	77	23
21	6,742	2,097	76	24
22	5,869	2,060	74	26
Average	6,563	2,077	76	24

The early days of oil gas were filled with doubts that it could ever take the place of coal gas or water gas. Doubters prophesied that the gas would not be fixed and that it would be impossible to maintain uniformity in candle power. These doubts and fears have all been allayed and oil gas as now made in California has the same stability as well made coal gas, with the further advantage that any desired candle power may be maintained and naphthaline stoppages can be practically controlled from the station.

Oil gas has another advantage which is most important from a humanitarian standpoint. In the days of coal gas, deaths from asphyxiation, either accidental or suicidal, were infrequent, but after the introduction of water gas the number of deaths from this cause materially increased, this increase was attributed to the greater amount of carbonic oxide contained in water gas. To be sure, illuminating gas is not sold to be inhaled, and when properly consumed the products of combustion of carbonic oxide are no more harmful than those from other gases, but as the percentage of carbonic oxide was greatly increased by mixing water gas with coal gas, and finally by the use of water gas alone, the mortality from gas asphyxiations correspondingly increased. These facts refer particularly to San Francisco, which has a cosmopolitan population, and more nearly resembles a foreign city than any other place in the United States.

An examination of the coroner's records show that nearly all of the deaths from gas asphyxiation were suicides, and this leads to the thought that when it became known that illuminating gas containing much carbonic oxide was a simple and convenient means to this end, it became popular. The introduction of oil gas immediately dropped the percentage of carbonic oxide to less than 7 per cent., and deaths from gas asphyxiation became rare. There followed many attempts at suicide which were unsuccessful, persons having deliberately turned on the gas in closed rooms, and after remaining under its influence for several hours, were easily resuscitated. A great many instances of this kind seemed to discourage the use of gas as a means of suicide. The subsequent improvements in oil gas which increased the percentage of carbonic oxide to 9 per cent., and the addition of lampblack water gas, which further increased it to between 10 and 11 per cent., has not increased the mortality from gas asphyxiation, this would seem to prove that very few deaths from this cause are purely accidental.

The question now naturally arises, in what localities can oil gas be made a commercial success? This depends primarily on the cost of oil and as oil gas can be made in large or moderate size machines with 9 gallons of oil, or less, the cost of oil per 1,000 cubic feet may be easily calculated from the cost of oil per barrel delivered in any given place. Next is the item of labor. In California, and particularly in San Francisco, labor is strongly unionized, and the wages of the men employed in gas works are much higher than in other parts of the country. The hours of labor are invariably 8 hours per day, so that it requires 3 shifts of men to operate any gas making apparatus. Gas makers received $110 per month, their helpers $90 per month, and no ordinary laborer is paid less than $2.50 per day for 8 hours work. With these high prices for labor prevailing, it is imperative that the largest units for gas making shall be employed and the large generators herein described have accomplished great saving in cost of labor in gas making.

During December, 1908, at the Potrero station in San Francisco, the amount of gas made was 267,792,000 cubic feet, and the cost of labor per 1,000 was as follows:

Generator labor, including gas makers, helpers and all men on the floor	$0.00811
Labor handling lampblack by hand	0.00585
This was before the installation of the crane for handling lampblack, and the estimated cost, substituting the crane for hand labor, would be	0.00333
All purification labor	0 00491
During June, 1909, the total make of gas was 170,776,000.	
The labor in the generating room was	0.00994
Handling lampblack	0.00522
Purification wages	0 00624

The miscellaneous labor about the works, including firemen, water tenders, engineers, helpers, other mechanics and office help, is about the same as in any economically operated water gas plant where no residuals are handled. The improvements in labor saving apparatus in oil gas making have thus kept pace with the increase in wages and the reduction of hours of labor, so that the present system of gas making is most economical, notwithstanding the obstacles presented by local conditions.

The future of oil gas depends largely upon the price of oil and the

practice of economy in the manufacture of gas. The first may be regulated by a gas company owning its own source of supply of oil, and the second rests in the hands of every conscientious worker in our industry.

Discussion.

Mr. Russell—I have listened to Mr. Jones' talk with a great deal of interest. It has been my pleasant experience to have had charge in San Francisco of a gas plant during the introduction of the manufacture of oil gas. At first lampblack was all over everything. They were trying to do almost everything with it except what they are doing now. I wish to corroborate Mr. Jones when I say that, if they had coal tar in California they would make gas out of it. If they had oil tar in California they would also make gas out of it. When you come to deal with an oil of from 12° to 15° B. it comes pretty near being of a coal tar constituency, but it is much easier to handle. The problems Mr. Jones has worked out in developing the oil gas industry and the work done by his fellow workers and the time in which they did it, I think should command our attention. The only question in my mind on the oil gas proposition is how long the price of oil is going to justify the present method of making oil gas in California. I will say this, that if the price of oil rises so that this process is not economical any longer, it will be an easy matter to change all of the present oil gas sets into water gas sets and proceed to make water gas. In other words, we have not wasted a lot of money on a temporary expedient, no matter what the price of oil may be in the future.

The Chairman—I will now hand over the meeting to the President, who, I understand, has some remarks to make.

The President—Gentlemen, it gives me great pleasure to say that not only have we had a very successful meeting up here, but the meeting below has been extremely successful, so much so that we may dismiss any fears that sectional meetings cannot be made a success. I am going to ask the members to bear in mind that the body as a whole will reconvene this afternoon here in this hall at 4 o'clock. The sectional meetings will be kept on until that time.

(To be Continued.)

[Official Report—Continued from Page 397.]

SECOND ANNUAL MEETING, INDIANA GAS ASSOCIATION.

Held in the Claypool Hotel, Indianapolis, Jan. 19-20, 1910.

Second Day—Morning Session.

The President—We will now have a paper by Mr. J. A. Perkins on

THE OPERATION OF A SMALL WATER GAS PLANT.

Mr. President and members of the Indiana Gas Association: The operation of a small water gas plant, on an economical basis, is a problem that is governed largely by the physical condition of the property, namely the storage capacity as well as the generating capacity as compared to the demand placed upon it.

On the plant I have in mind, in writing this article, it is possible to make and store the 24 hours' supply in 12 hours' operation. With these conditions, it is possible to operate the plant 90 per cent. of the time with 3 men; namely, 1 gas maker, 1 fireman, and 1 extra man, who can be used to make gas, or fire the boiler in the event of sickness, or other causes, of either the regular gas maker or fireman. This, of course, is on occasion only. His regular work consists of the receiving and checking of material, making repairs, unloading oil, generator fuel, steam fuel, etc., as well as testing meters, and making minor repairs on same. In selecting a man to fill this position, a great deal of care must be exercised, as on a small plant it is out of the question to have a works' superintendent, and the management must depend, to some extent, on this man and the gas maker for results. The machine, if operated at least to its capacity, and the best results obtained, will occupy nearly all the gas maker's time.

The management should keep in very close touch with his gas maker and keep the feeling always uppermost in the gas maker's mind of trying to always get a little more out of the materials used than he did the preceding month, and, if after an earnest effort, the results obtained seem to be falling off, take the matter up with him in a quiet way and help him solve the difficulty which may lie in his oil, generator fuel, blast pressure, or condition of his checkers. If, on the other hand, you censure him without going deeply into the subject, he is apt to try to mislead you in reporting stock used, or become discouraged and, then he is simply a mechanical part of the machine and not an enthusiastic worker for you. On the one hand, he will only care to get his gas made and get away; on the other hand, he will keep close tab on his fireman, insist on all unburned coke from the cleanings be separated from the ashes, watch the saving of all tar, and the economical use of water, and, in fact, all his interest is centered in his machine, and the results obtained.

A word of encouragement from the manager, when results are above the average, is a material help towards this end. This applies to the extra man as well, as part of his duties are the changing of purifier boxes, the drains, and the general upkeep of the buildings and lot.

In arriving at results obtained for each day, it is well to inventory the total oil on hand each morning and use the difference in stock as the amount used rather than to go by meter or gauge measurement, as if you only inventory the total oil on hand once a month, you will find a discrepancy at the end of the month. It is to late then to change any part of the method of running. The same holds true in regard to the generator fuel and boiler fuel; if left to the end of the year, of course, in the case of generator and boiler fuel, it would not be practical to inventory each morning, but at the end of the month it should be done.

The oil storage tank is a known quantity per inch in depth. The fuel is an irregular pile to measure and compute, but if the scales are watched carefully, the difference will not amount to much.

On a small water gas plant the only residual it is possible to recover is the tar; all drains, if it is possible, should go to one tank or well, and the larger this the better, as, if the tar is to be sold instead of burned, the longer it lays in the settling well, the lower the percentage of water will become, as when it leaves the condensers, scrubbers and wash-box, the percentage of water is very high; if burned, this does not make a great deal of difference.

If it is possible to pump the water from the top of this settling well back into the wash-box, over and over, it means a considerable saving in oil and candle power.

If the scrubbers are high enough to permit the cooling water from them to flow into the wash-box (as they are in the case I have in mind) instead of cold water, it makes a material difference in oil results, as this water is hot and has more or less light oils and tar in it.

The spacing used in checkering, of course, has to be governed by the grade of oil used, as well as the blast pressure, steam pressure, length of runs, generator fuel, etc. The best results obtained in this instance, with 48-hour coke and a good grade of gas oil, was with a blast pressure of 16 inches, and a steam pressure of 140 pounds.

In transferring the gas from the relief holder to the storage, the water line and temperature of the meter must be watched very closely, as the whole basis of results, both at the plant and the per cent. of accounted-for gas, hinges on the accuracy of the station meter.

The station meter must be tested at least once a year.

In the matter of purification of the gas on a small plant, it is cheaper to buy iron sponge already prepared, as the quantity used is so small that if we attempt to prepare it ourselves, instead of buying it all ready to use, there is a chance of extra labor charges creeping in and raising the cost per 1,000 feet produced, more than is saved in purifying material.

All drips around the plant should be pumped periodically and nature of drip water examined. This holds particularly true of the drips in the relief holder. (To be Continued.)

Meeting Times of the Various Gas Associations.

American Gas Institute.—Annual meeting, October, 1910. New York City. Officers: President, Wm. H. Bradley, N. Y., City; Secretary, A. B. Beadle, 29 West 39th street, N. Y. City.

Canadian Gas Association.—Annual meeting, June, 1910. Hamilton, Ont Officers: President, J. S. Norris, Montreal, P. Q.; Secretary and Treasurer, A. W. Moore Woodstock, Ont.

Empire State Gas and Electric Association.—Annual meeting, Nov., 1910. New York City. Officers: President, C. R. Huntley, Buffalo, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Guild of Gas Managers of New England.—Annual meeting, December. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, A. K. Quinn; Newport, R. I.; Secretary, Walter G. Africa, Manchester, N. H.

Illinois Gas Association.—Annual meeting, time, March 15-16, Chicago, Ills. Officers: President, E. G. Schmidt, Springfield, Ills.; Secretary-Treasurer, C. B. Strohn, Elgin, Ills.

Illuminating Engineering Society.—Annual meeting, January —, 1911. Meetings of Sections, monthly. President, W. H. Gartley, Philadelphia, Pa.; Secretary, Preston S. Millar, 29 W. 39th street, N. Y. City. Sections: New York: Secretary, Albert J. Marshall, 227 Fulton street. New England, Secretary, L. D. Gibbs 39 Boylston street, Boston, Mass. Philadelphia, Secretary, F. N. Morton, Broad and Arch streets. Chicago, Secretary, T. R. Beebe, 157 Michigan avenue,

Indiana Gas Association.—Annual meeting, January 19, 1911, Fort Wayne, Ind. Officers: President, Carl H. Graf, Indianapolis; Vice-President, S. E. Mulholland; Secretary-Treasurer, Philmer Eves, Indianapolis Gas Company, Indianapolis, Ind.

Iowa District Gas Association.—Annual meeting, time, June 23, 24, 25, 1910, Sioux City, Ia. Officers: President, Geo. H. Waring, Omaha, Neb.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, ———— Wichita, Kas. Officers: President, W. A. Scothorn, Hutchinson, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association.—Annual meeting, time, September, 1910; ——— ——— ——— Officers: President, B. O. Tippy, Grand Rapids, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April 14, 15 and 16, 1910; Jefferson City, Mo. Officers: President, W. A. Bixby; Secretary and Treasurer, C. L. Ciary, Sikeston, Mo.

National Commercial Gas Association.—Annual meeting, December, 1910: Boston. Officers: President, E. N. Wrightington, Boston; Secretary, Louis Stotz, 36 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May 17, 18 and 19, 1910; Oklahoma City, Okla. Officers: President, William H. McKenzie, Kansas City, Kas.; Secretary, T. C. Jones, Delaware, O. Editor Wrinkle Department, F. W. Stone, Ashtabula, O.

New England Gas Association.—Annual meeting, third Wednesday in February; Boston. Officers: President, W. H. Snow, Holyoke, Mass.: Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

Oklahoma Electric Light, Railway and Gas Association.—Annual meeting, May 18, 19 and 20, 1910; Oklahoma City. Officers: President, F. H. Tidman, Oklahoma City, Okla.; Secretary-Treasurer, Galen Crow, Guthrie, Okla.

Pacific Coast Gas Association.—Annual meeting, Sept. 20, 21 and 22, 1910, Los Angeles, Cal. Officers: President, W. B. Cline, Los Angeles, Cal.; Secretary-Treasurer, John A. Britton, 925 Franklin street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, April 13, 14 and 15, 1910, Easton, Pa. Officers: President, E. G. Holzer, Easton, Pa.: Secretary-Treasurer, William H. Merritt, Lebanon, Pa.

Society of Gas Lighting.—Annual meeting, December, 1910; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 1123 Broadway, New York.

Southern Gas Association.—Annual meeting, Feb. 16, 1910, Montgomery, Ala. Officers, President, H. W. Frund, Salisbury, N. C.; Secretary-Treasurer, James Ferrier, Rome: Ga.

Southwestern Electrical and Gas Association.—Annual meeting. ———————, 1910, Beaumont, Tex. Officers: President, R. B. Stichter, Dallas, Tex.; Secretary's office, 300 Commerce street, Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 11 and 12, 1910, Milwaukee, Wis. Officers: President, R. B. Brown, Milwaukee, Wis.; Secretary-Treasurer, H. H. Hyde, Racine, Wis.

Items of Interest
FROM VARIOUS LOCALITIES.

A CORRESPONDENT in St. Louis, Mo., under recent date, says: "The gas engineer has again been called to the aid of another business. Recently a Nashville (Tenn.) Company required a furnace that would be under control at heats varying as greatly as 1,200° F., while at the same time it was required to charge and discharge the oven quickly and automatically. Unable to get any furnace engineering company to guarantee this duty, the concern called in a gas bench builder, and the result was a complete set of plans for an installation that included loading and discharging machines for use with inclined retorts. Tests were made on the site to ascertain the correct angle of repose for this particular material. The complete plant will be supplied and erected by the Evens & Howard Firebrick Company. Incidentally, in making the tests, the Company's Chemist (Mr. Little) found the Company had control of a likely deposit of ferric oxide, 10 per cent. purer than the average native Irish bog ore, and it is not unlikely you will hear more of this particular natural purifying material consequent upon some tests that are now being completed."

THE H. M. Byllesby Company announces that the Board of Directors of the Oklahoma Gas and Electric Company has declared a quarterly dividend of 1½ per cent. upon the common stock, payable March 15 to stockholders of record February 28. Books close March 1 and reopen March 11. Also that the Board of Directors of the San Diego Consolidated Gas and Electric Company has declared a quarterly dividend of 1½ per cent. upon the common stock, payable March 15 to stockholders of record February 28. Books close March 1 and reopen March 11. They recently added to their holdings the Olympia (Wash.) Gas Company, which they purchased at public auction for $55,000.

THE plant of the Gadsden (Ala.) Gas Company is to be considerably enlarged, the most important work being the new holder to be constructed by the Western Gas Construction Company.

THE Denver (Col.) Gas and Electric Company have decided to spend large sums for extensions during the coming summer. Additions to the plant will be necessary, as the mains will be extended to cover he outlying sections of Washington Park, Montclair, Elyria and Globeville.

SAMUEL T. BODINE, First Vice-President and General Manager of the United Gas Improvement Company, sailed recently for Europe, to spend a much needed rest.

THE annual report of George W. Pettibone, Manager of the Westfield (Mass.) municipal gas and electric light plant, states that the price of gas will be reduced from $1.30 to $1.20 per 1,000 feet, and the price of electricity from 16 cents to 12 cents per 1,000 kilowatts.

THE Laclede Gas Light Company has declared a regular quarterly dividend of 1½ per cent. on the common stock, payable March 15. Books close March 1 and reopen March 16.

MR. GEORGE A. SNOW was re-elected Vice-President of tne Utah Gas and Coke Company, of Salt Lake City, Utah, at a meeting of the Board of Directors held in Chicago on the 16th ult. Arthur L. Farwell was chosen President to succeed Douglas Smith; John P. Primley, Jr., was elected Chairman of the Board of Directors.

THE gross earnings of the Western United Gas and Electric Company, for the year ending October 21, 1909, $624,333, an increase of $54,929, or 9.64 per cent. over the previous year. After payment of expenses and fixed charges a balance remained of $160,955, an increase of $32,443, or 21.84 per cent.

THE announcement of the Department of Commerce and Labor Bureau of the Census, Washington, D. C., regarding Mines and Quarries Census, is as follows: The Geological Survey and the Census Bureau have entered into a joint arrangement by which the Survey is relieved of the collection of statistics of the annual production of minerals for the year 1909. That work is, by the agreement, merged in the Census Bureau's activities under the 13th Census Act, which requires a census of mines and quarries for 1909. Consequently, the Survey will not this year send its own schedules to the mine and quarry operators. The Census Bureau's general and supplementary schedules relative to this branch of its decennial work include the inquiries in which the Survey is interested and such other data as may be necessary for the latter's reports will be furnished the Survey by the Census Bureau. The schedules will be collected by the Census special agents and enumerators. The co-operative arrangement was in recognition of the necessity of uniformity in the compilation of the statistics, the elimination of duplicate work and inquiries, and the desirability of economy in the collection of the required data.

AT the annual meeting of the Massachusetts Lighting Companies, on the 23d ult., the Trustees were authorized to issue 3,600 additional shares of stock. The new stock is to be offered to stockholders of record at $110 per share, in the ratio of one new share for 20 shares now held. This will increase outstanding stock of the Massachusetts Lighting Companies to $3,030,300. Proceeds of the new stock issue will be used for payment for the capital stock of the Northampton (Mass.) Gas Light Company, recently purchased by the Company. The price of gas in that city is to be reduced from $1.35 to $1.25 per 1,000 cubic feet.

AFTER considerable research and much experimentation, the Connelly Iron Sponge & Governor Company, 50 Church street, New York city, have perfected a thoroughly safe and efficient hand lamp, depending for its actuation on a dry storage battery, which latter can be recharged from an ordinary lamp socket on a 110-volt, direct current, which power is usually available by most gas companies. This lamp has every refinement known to science of the present day. The switch for the purpose of lighting is inside, thus insuring positive safety. The globe and reflector give a maximum diffusion and radiance of illumination, being equipped with a 4-volt, tungsten, incandescent bulb having a burning capacity of from 12 to 15 hours on one charge. Heretofore, similar lamps were supplied with dry batteries, and these when exhausted were only fit to decorate the waste pile or wet storage battery, the latter being very objectionable owing to the spill of strong acid. These lamps are particularly valuable, as every gas man knows for entering or working in a manhole, trench, pit, sub-cellar, meter or purifying box, or other situation where one encounters explosive gases. Then, too, a watchman on his tour of inspection cannot always be assured of safe, pure air. One of these lamps necessarily eliminates the happening. It is believed by the manufacturers that in this lamp they have succeeded in meeting a long-felt want of the trade, and are confident that their favor will shortly be widespread.

THE New York Public Service Commission, Second District, has received a petition from the Palmyra Gas and Electric Company, Newark Gas Light and Fuel Company, New Light, Heat and Power

Company, of Newark; Lyons Gas Light Company and Wayne County Electric Company, for the approval of the consolidation of these Companies into the Wayne County Gas and Electric Cmpany, and to make a mortgage covering all the properties of the consolidated Companies and to issue bonds thereunder. The towns covered are: Palmyra, Arcadia, Lyons and Galen, all in the county of Wayne. The capital stock of the new corporation is to be $200,000. Authorization is asked for the execution of a mortgage to the amount of $750,000 and to issue bonds to the amount of $500,000. The plan of consolidation provides for the reduction of the capital stock of the Company below that of the combined stock of existing Companies by $45,000. One of the results of the consolidation claimed by the petitioners is that it will reduce the cost of operation, reduce the cost of executive force of the five Companies coming into consolidation, reduce the cost of bookkeeping and accounting necessary for five plants, simplify the entire operation and doubtless reduce the cost of supplies, inasmuch as the consolidated Company can purchase for the five plants. It is also expected that a better market for the securities can be obtained under the consolidated Company than by the separate properties.

THE Taunton (Mass.) Gas Light Company has petitioned the Gas Commissioners for authority to issue $60,000 additional capital stock of a par value of $50 per share, for the purpose of retiring bonds and the outstanding indebtedness.

A NUMBER of important changes in the personnel of the Pacific Gas and Electric Company, of San Francisco, Cal., have been announced as follows: Mr. John S. Dunn the Vice-President will become one of the Directors and will be succeeded by Mr. A. F. Hockenbeamer. Mr. T. V. T. Lee, Assistant General Manager, and Engineer James H. Wise, have presented their resignations.

WE are indebted to the courtesy of Mr. W. B. Snyder, Superintendent of the "Mining Experiment Sub-Station," Hebron, N. D., a sub-station of the School of Mines, Experimental Station, College of Mining Engineering, State University of Grand Forks, N. D., for the following interesting note: "It may be of interest to you to know that I have just finished installing what is perhaps the best experimental illuminating gas plant in the United States. It consists of a bench of one, with supplementary condensing, scrubbing and exhausting machinery, with a 1,000 cubic feet gasholder. The arrangement for reading the temperature and pressure in the various parts of the plant is especially fine, since those can all be read at a central table. This is accomplished by means of a central, differential pressure gauge and a switchboard coupled to an indicator and resistance thermometers. The entire plant was furnished by the Gas Machinery Company, of Cleveland, O."

THE Thornapple (Mich.) Gas and Electric Company, supplying the towns of Hastings, Middleville, Nashville and Lake Odessa, will practically rebuild their gas plant this year, in order to handle the growing needs of the business.

THE Plymouth County (Mass.) Gas Light and Power Company has obtained a franchise from the town of Randolph, and will extend its system to provide gas supply there as soon as the weather will permit.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 10 cents.

948,334. Safety Attachment for Gas Burners. C. Liaci, New Haven, Conn.
948,340. Gas Regulator. W. R. Park, Taunton, Mass., assignor to the United Injector Company, New York City.
948,561. Gas Log. O. E. Hansen, Perth Amboy, N. J.
948,664. Apparatus for Purifying Blast Furnace Gas. H. Savage, Seraing, Belgium.
948,724. Gas Supply Controlling Device. H. O. Ewing, Middleport, O.
948,745. Apparatus for Making Petrolized or Air Gas. W. Shearer, Eskbank, Scotland.
948,835. Ammonia Condenser. B. Walter, Pittsburgh, Pa.
948,995. Mantle Protector and Holder. G. E. Hulse, Newark, N. J., assignor to Safety Car Heating and Lighting Company.
949,010. Manufacture of Incandescent Bodies for Gas Lights. Max von Unruh, Charlottenburg, Germany.
949,032. Gas Sterilizer and Purifier. V. Ernsberger, Fremont, O.
949,050. Gas Burner. P. J. Atzberger, Cleveland, O.
949,547. Inverted Incandescent Gas Lamp. G. Raap, Berlin, Germany, assignor to Selas Gesellschaft mit Beschrankter Haftung, same place.
949,599. Self Igniting Gas Burner. H. Ruppert, Zurick, Switzerland.
949,674. Gas Retort Furnace. R. M. Brooke, West Vale, near Halifax, England, assignor to R. Dempster & Sons, Limited, Elland, England.
949,676. Gas Burner. J. Davis, Washington, D. C.
949,841. Apparatus for use in the Manufacture of Gas. P. Plantinga, Cleveland, O.
950,067. Manufacture of Gas for Illuminating, Heating or Power Purposes. H. S. Elworthy, St. Albans, England.
950,150. Pressure Gas Valve and Controlling means therefor. F. O. H. Fincke, College Point, N. Y.
950,270. Meter Box. L. P. Andrews, Sedalia, Mo.
950,382. Gas Cock. E. J. Farnan, Brooklyn, N. Y.
950,393. Opening and Closing Apparatus for Gas Pipes. K. Hoffler, Neuerburg, Germany.

PUBLIC LIGHTING TABLES FOR MARCH, 1910.

These tables are those used for computing the various times during the year, for New York and vicinity, when public lamps of all sorts are to be lighted and extinguished. As will be seen they include the all night and every night practice, and the moontable schedule as well. They were compiled by the American Meter Company, New York city.

Table No. 1.
FOLLOWING THE MOON.

Day of Week.	Date.	Light.	Extinguish.
		P.M.	
Tue.	1	6.20	12.20 A.M.
Wed.	2	6.20	1.20
Thu.	3	6.20 L.Q.	2.20
Fri.	4	6 20	3.20
Sat.	5	6.20	4.20
Sun.	6	6.30	5.10
Mon.	7	6.30	5.20
Tue.	8	6.30	5.20
Wed.	9	6.30	5.20
Thu.	10	6.30 N.M.	5.20
Fri.	11	6.30	5.20
Sat.	12	6.30	5.20
Sun.	13	6.40	5.10
Mon.	14	6.40	5.10
Tue.	15	10.30	5.10
Wed.	16	11.40	5.10
		A.M.	
Thu.	17	12.50 F.Q.	5.10
Fri.	18	1.50	5.10
Sat.	19	2.40	5.10
Sun.	20	3.20	5.00
Mon.	21	4.00	5.00
Tue.	22	4.20	5.00
Wed.	23	4.50	5.00
Thu.	24	No L.	No L.
Fri.	25	No L. F.M.	No L.
Sat.	26	No L.	No L.
Sun.	27	6.50 P.M.	9.10 P.M.
Mon.	28	6.50	10.10
Tue.	29	6.50	11.10
Wed.	30	6.50	12.10 A.M.
Thu.	31	6.50	1.10

Table No. 2.
NEW YORK CITY.
ALL NIGHT LIGHTING.

Day of Week.	Date.	Complete Lighting in 1 Hour.	Complete Extinguishing in 50 Minutes.
		From Time Given.	
		P.M.	A.M.
Tue.	1	5.22	5.32
Wed.	2	5.22	5.27
Thu.	3	5.22	5.27
Fri.	4	5.22	5.27
Sat.	5	5.32	5.17
Sun.	6	5.32	5.17
Mon.	7	5.32	5.17
Tue.	8	5.32	5.17
Wed.	9	5.32	5.17
Thu.	10	5.32	5.17
Fri.	11	5.32	5.17
Sat.	12	5.42	5.07
Sun.	13	5.42	5.07
Mon.	14	5.42	5.07
Tue.	15	5.42	5.07
Wed.	16	5.42	5.07
Thu.	17	5.42	5.07
Fri.	18	5.42	5.07
Sat.	19	5.52	4.57
Sun.	20	5.52	4.57
Mon.	21	5.52	4.57
Tue.	22	5.52	4.57
Wed.	23	5.52	4.57
Thu.	24	5.52	4.57
Fri.	25	5 52	4.57
Sat.	26	5.57	4.47
Sun.	27	5.57	4.47
Mon.	28	5.57	4.47
Tue.	29	5.57	4.47
Wed.	30	5.57	4.47
Thu.	31	5.57	4.47

TOTAL HOURS DURING 1910.

	Hrs. Min.
January	229.00
February	188.20
March	184.10
April	161.40
May	152.00
June	136.50
July	146.20
August	165.50
September	181.30
October	217.10
November	224.50
December	249.30
Total, year	2237.10

TOTAL HOURS DURING 1910.

	Hrs. Min.
January	428.30
February	358.15
March	353.10
April	298.10
May	263.20
June	234.45
July	248.30
August	278.00
September	311.25
October	370.05
November	397.40
December	438.35
	3980.25
Deduct on account of 50 minutes extinguishing time	30.25
Total, year	3950.00

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO., PROPRIETORS.

THOS. J. CUNNINGHAM, ELBERT P. CALLENDER, EDITORS.

MONDAY, MARCH 7, 1910.

The Market for Gas Securities.

The market for Consolidated gas broadened materially last week, and yesterday (Thursday) the rather high total of 10,000 shares changed hands, at a net gain between opening and closing of ¼ point or 147¼. The bid at the opening to-day was 147 to 147½. Brooklyn Union continues to show remarkable strength, and on total sales yesterday of 600 shares, a net gain of 1½ points was recorded. The Company has just declared a dividend (presumably semi-annual) of 3 per cent., payable the 1st prox. As near as the writer can determine, a new modern plant will be commenced this season, the site being close to that now occupied by its Metropolitan branch.

Outside gas securities are all fairly steady, and decided gains have been scored in Massachusetts gas, the common of which is up to 80½ bid, and the preferred is 10 points higher. Peoples, of Chicago, looks awfully tempting at the quoted rate. U. G. I. script is 178 bid.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

MARCH 7.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	147	147½
Central Union Gas Co. — 1st 5's, due 1972, J. & J.	3,000,000	1,000	98	101
Equitable Gas Light Co.— Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	2,500,000	100	155	165
New Amsterdam Gas Co.— 1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	100	101
New York and East River— 1st 5's, due 1944, J. & J.	3,500,000	1,000	104	107
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union— 1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1960, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	156	156½
1st Con. 5's, due 1948, M. & N.	15,000,000	—	95	99
Yonkers	299,650	500	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	.65	.70
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	90	96
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	73	73½
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,000,000	1,000	104	106½
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,662,750	100	90½	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	—	105
Mortgages, 6's	3,600,000	—	—	118
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	458,000	—	102	105
Detroit City Gas Co	5,000,000	50	—	50
" Prior Lien 5's	4,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	102
Essex and Hudson Gas Co.	6,500,000	—	30	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	108	108½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	92	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis	10,000,000	100	106	106½
Preferred	2,500,000	100	—	98
Bonds	10,000,000	1,000	104	—
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co. " 1st Mtg. 6's	350,000	1,000	106	106½
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	80½	81
Preferred	25,000,000	100	90½	92
Montreal Gas Co., Canada	3,000,000	100	218	218½
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	111	111½
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104½	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.— 1st Mtg. 5's	751,000	1,000	100	102
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgages, 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	90	95
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	100	104
Washington (D. C.) Gas Co.	1,600,000	200	342½	345
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	351	—

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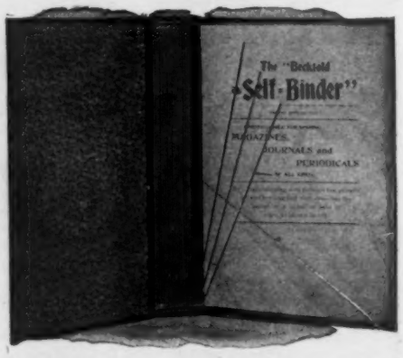

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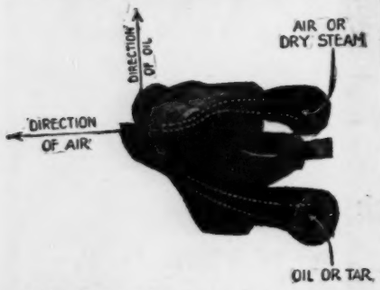

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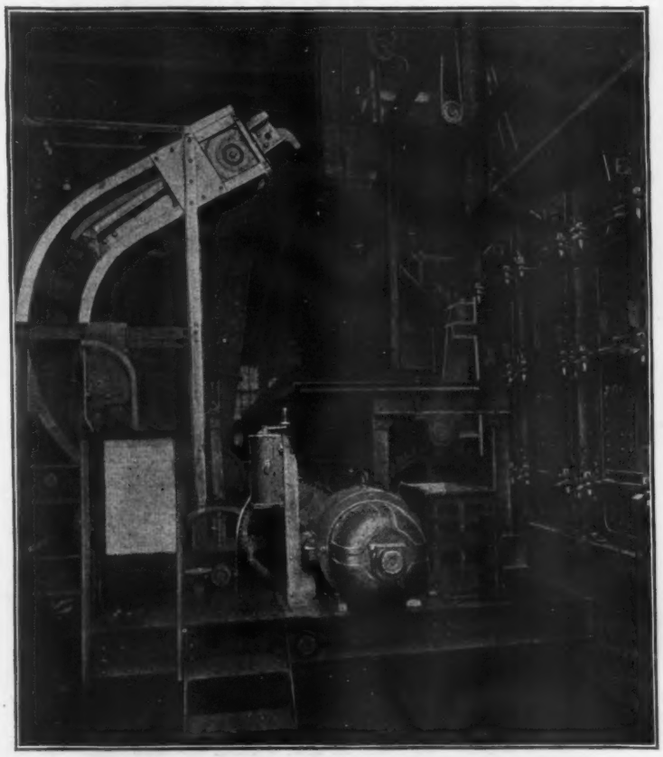

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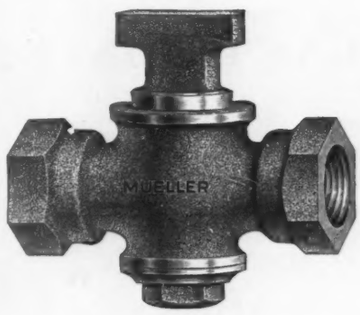

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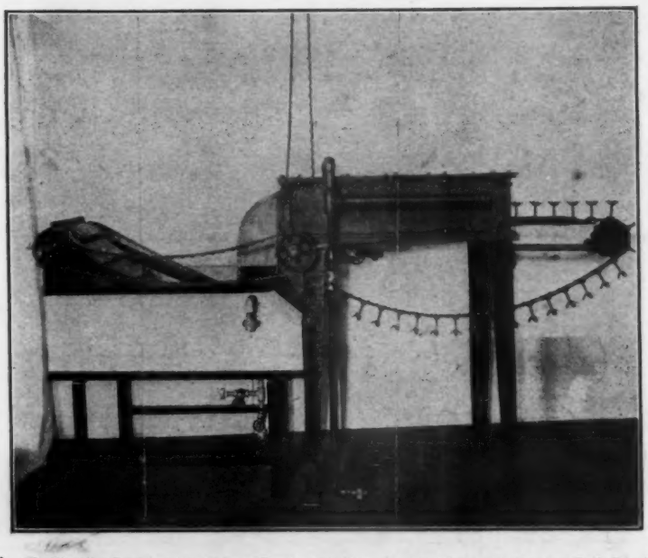

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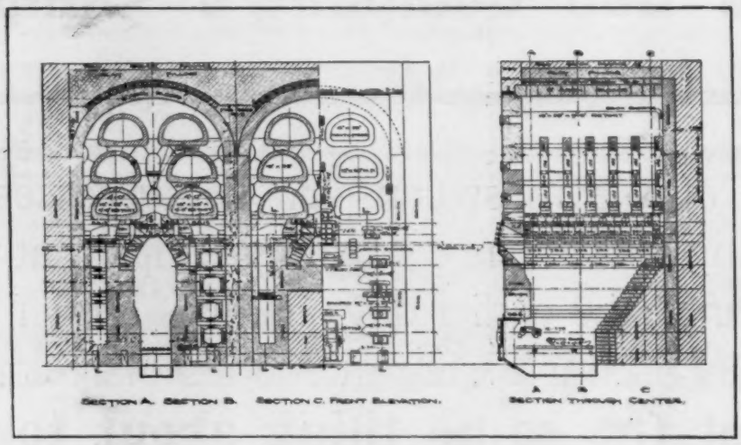

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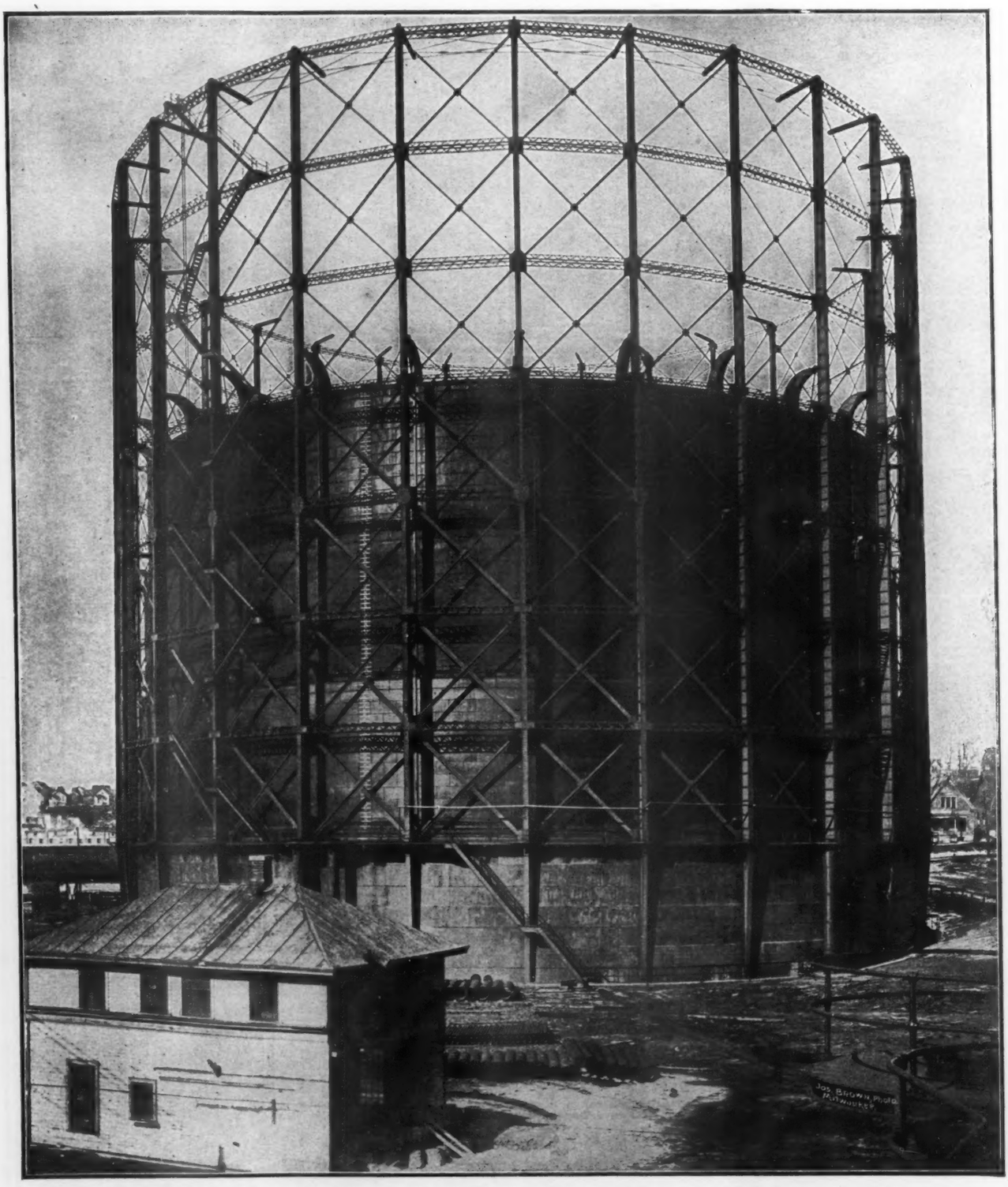

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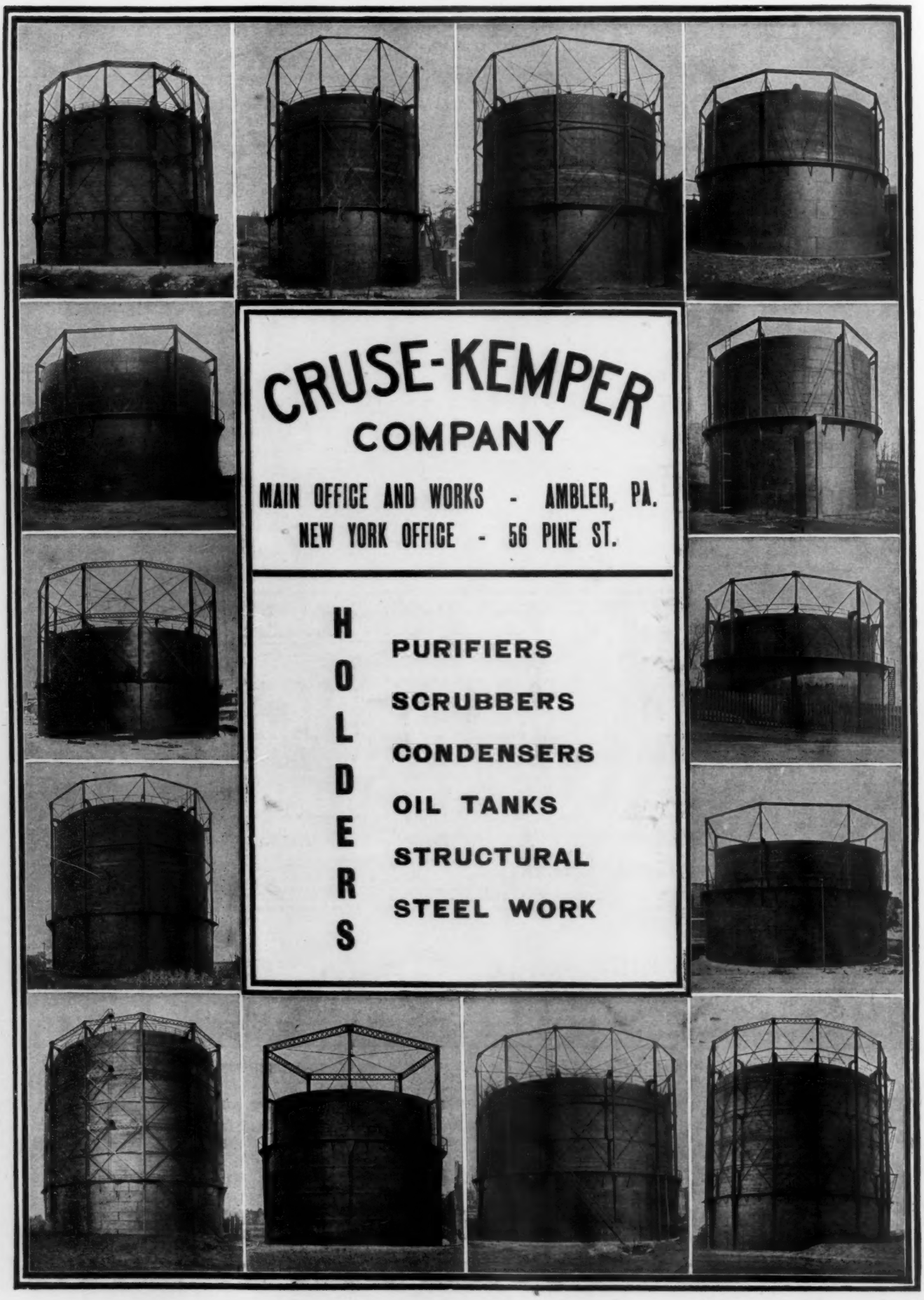
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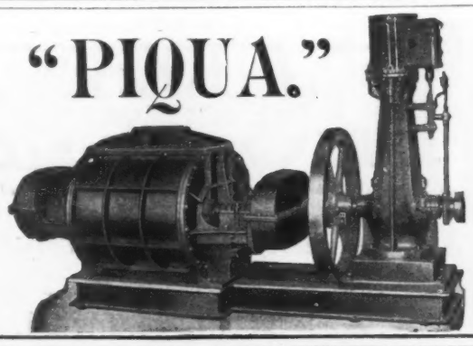

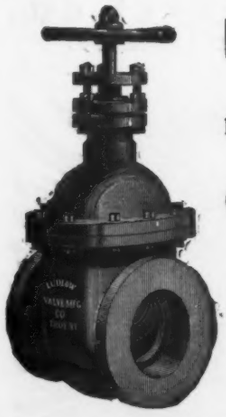

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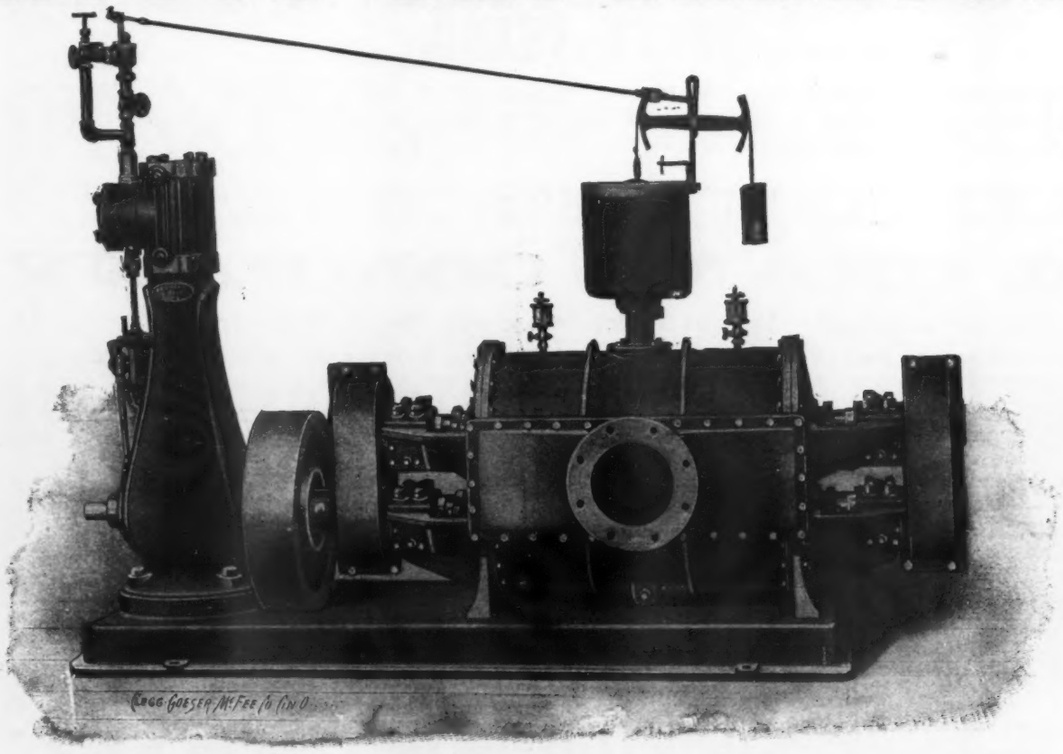

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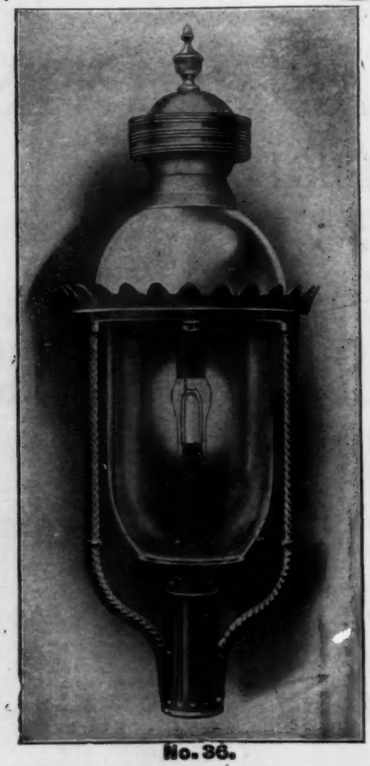

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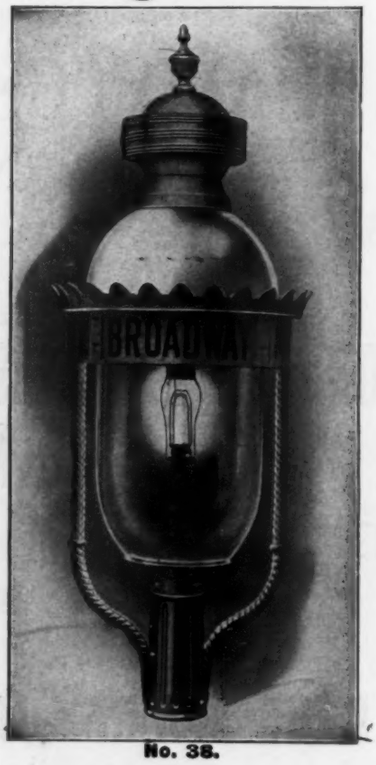

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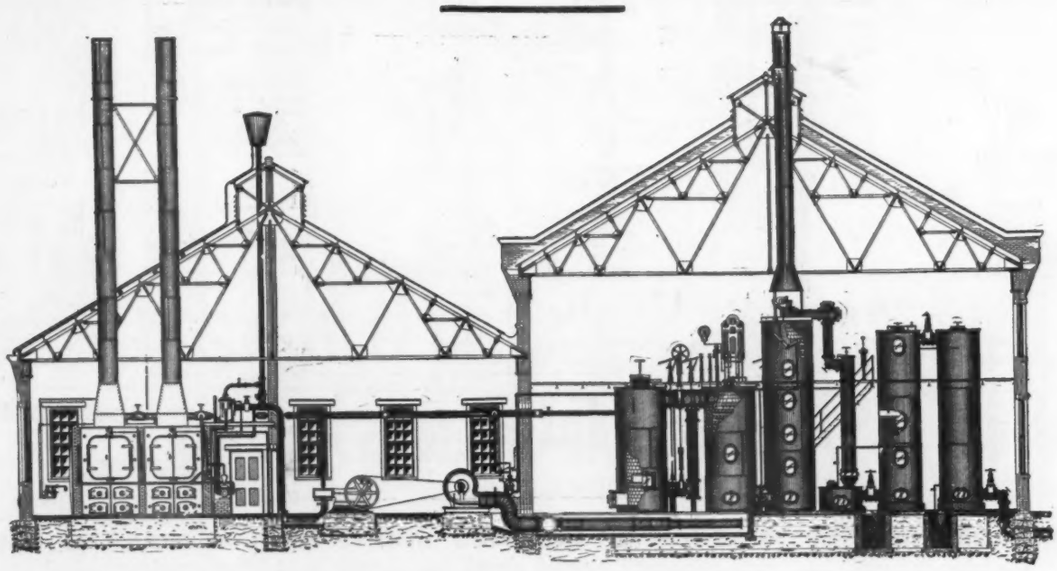

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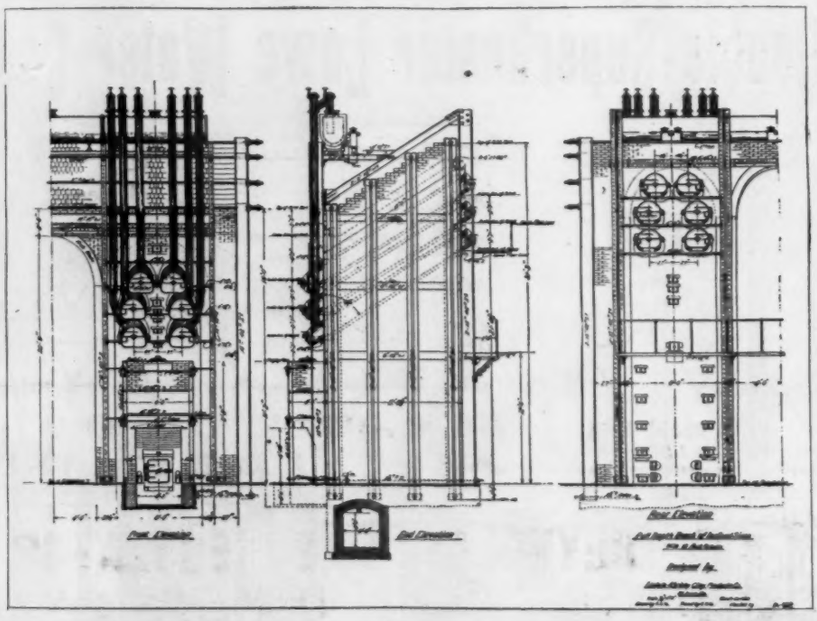

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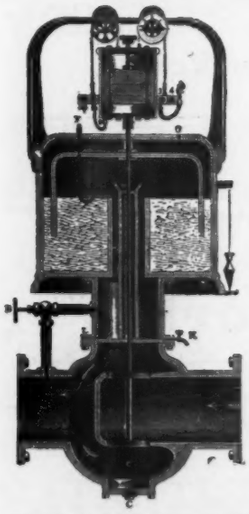

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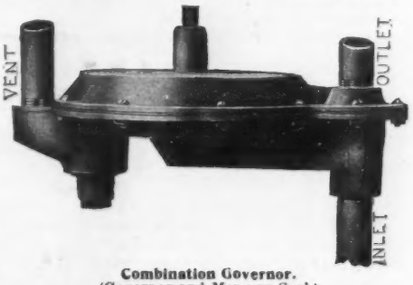

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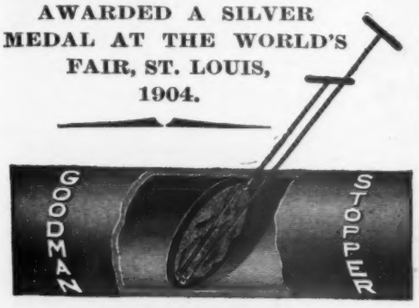

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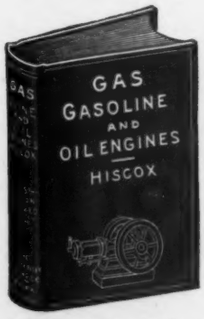

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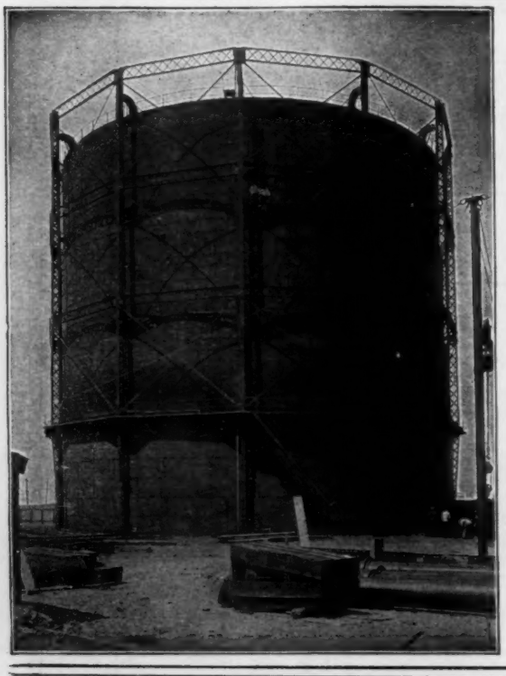

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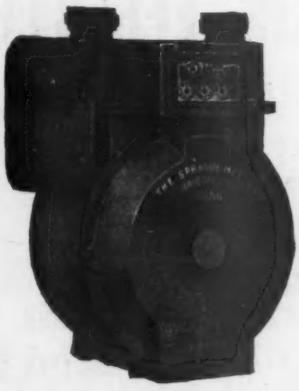

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